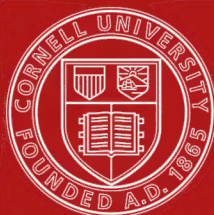


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MEDICAL TRACTS,

READ AT

THE COLLEGE OF PHYSICIANS

BETWEEN THE YEARS

1767 AND 1785.

BY

SIR GEORGE BAKER, BART. M.D.

F.R.S. AND F.A.S.

COLLECTED AND REPUBLISHED

BY HIS SON.

LONDON :

PRINTED BY W. BULMER AND CO. CLEVELAND ROW,

ST. JAMES'S ;

AND SOLD BY PAYNE AND FOSS, PALL MALL,

1818.

yes

THE following Papers were originally read at the College of Physicians, at different periods, and they are now printed collectively with a view of rendering them more useful to the world than they could be when scattered in detached pieces through the miscellaneous pages of the Medical Transactions.

Several of the Tracts will shew, that the attention of the Author was very particularly directed to the consideration of the pernicious effects of lead, and the diseases which, in a manner unperceived and unsuspected, arose from it. Being a native of Devonshire, he had occasion to observe, that the inhabitants of that County were generally subject to a fatal disease, of a peculiar character, the symptoms of which had a strong affinity to those produced by a solution of lead ; and he exerted himself, in a most zealous manner, to combat the

rooted prejudices and customs of a great majority of his countrymen, and to prevent, if possible, the use of that destructive mineral in the machinery employed in the process of making Cyder. It is a fact, well ascertained, that a malady, which from its former prevalence in the County had acquired the name of the Devonshire Colic, is at this time hardly known to exist there. Thus, by the acuteness of his observation, he discovered the cause of a most afflicting and fatal disorder; and by his perseverance in recommending the disconti-

nuance of a long, and generally prevailing usage, he was the fortunate means of preserving the health and the lives of thousands.

In the commencement of the practice of inoculating the small-pox, he published a pamphlet on that subject, intituled, “An Inquiry into the merits of Inoculation,” which is alluded to in one of the Papers of this collection ; but the object of it being to recommend a plan, which has since been generally adopted, the occasion of that little work, which possessed

much interest at the time, has been so entirely superseded, that it has been deemed superfluous to republish it in the present collection.

In offering these select Tracts to the public, the Editor may be permitted to add, that the revered Author of them was, in his early studies and researches, as well as in the practice of his profession, possessed of a peculiar judgment and penetration, united with a liberality, and candour, which could not fail to engage the friendship and esteem of his contempora-

ries. His great delight was in objects of literature, and in the society of literary characters, among whom his talents shone conspicuous. He was remarkable for a most tenacious memory and for the elegance of his classical taste ; and his works were distinguished by the easy flow and purity of their style, both in the English and the Latin language.

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MISCELLANEOUS
PAPERS.

I. *An Inquiry concerning the Cause of
the Endemial Colic of Devonshire.*

Read at the COLLEGE June 29, 1767.

A VERY small acquaintance with the writings of physicians is sufficient to convince us, that much labour and ingenuity have been most unprofitably bestowed on the investigation of

remote and obscure causes : while those, which are immediate and obvious, and which must necessarily be admitted, as soon as discovered, have been too frequently overlooked and disregarded. Such a spirit of refinement in theory has, in several instances, been the parent of dangerous errors in practice : men are apt to be as partial to their own conceits, as to their own offspring ; and those opinions seldom fail to govern at the bed-side, which have been the result of much contemplation in the closet. It is with true pleasure I acknowledge, that this spirit is a fault, not so much to be imputed to the present, as to

the last age. We have now learned not to indulge ourselves in visionary speculations, but to attend closely to nature. We observe diseases in themselves ; and trace the powers of medicines in their effects on the human body ; and experiment is the great *basis* of our reasoning. In many cases indeed, from our very limited knowledge, we are still obliged to allow, in some degree, the doctrine of the empiric sect, *non-interesse quid morbum faciat, sed quid tollat* ; yet are we far from being such empirics, in the modern sense of the word, as to pay no regard to those causes, which are manifest and within

our reach ; such causes more especially, as lead us directly either to the cure of diseases, or, what is more desirable, to the prevention of them.

Of this last kind is that cause, to which, I apprehend, the provincial disease is owing, which is the subject of the present inquiry. And, if I am not mistaken in my notion, the maxim will hold good in this instance, and in an higher sense than is usually intended by it, that *cognitio causæ morbum tollet*. Reform but the mischievous practice, which occasions the disorder, and it will cease of course : it will be no longer

endemic, and peculiar almost in one part of England ; and in other parts, perhaps, by the same means, be less frequent than it is. But I flatter myself, I shall be doing an especial service to the inhabitants of my native county, if, by giving them notice of a mischief, of which they are not aware, I may induce them to avoid it, and may at once promote the health and prosperity of my countrymen.

The earliest account of the Devonshire colic, which I have met with, is in Dr. William Musgrave's *dissertatio de arthritide symptomatica*, published in

the year 1703. In the fifth section of the tenth chapter *de arthritide ex colica*, is the following passage: “ Alia vero colica,
 “ apud Damnonium, ex pomaceo immiti et acido, nimis
 “ usurpato, derivatur ; id quod
 “ ex eo liquet, siquidem illos
 “ solum infestat, qui potioni isti
 “ assuevere, eademque ratione
 “ qua sunt assueti: sic ut iis
 “ tempestatibus, quæ pomaceo
 “ abundant, crescat, et in vulgus ea grassetur ; contra vero,
 “ Pomona copiam negante, rarius observetur.”

It seems here very particular, that Dr. Musgrave should say so much of this colic, which

he represents to be the effect of crude and sharp cyder ; and make no mention of those essential and pathognomonic symptoms, by which it is at this time distinguished. Are we to suppose that when Dr. Musgrave lived, it had not been observed to terminate in palsy, or epilepsy ? That he was well acquainted with a disease exactly similar to this, namely the colic of Poytton, is very certain ; for in the fourth history of the same tenth chapter, he mentions the case of a gentleman, who “ *ætatis flore,*
“ *colica, quam pictonicam ap-*
“ *pellant, aliquandiu vexatus,*
“ *ex more et progressu istius*
“ *mali ordinario, incidit in pa-*

“ralysin ; artus exinde marci-
 “dos, graciles, ἀκινήτους habens ;
 “per reliquum vitæ clinicus.
 “Paralysi sub ejus initium ac-
 “cesserunt dolores erratici, in-
 “certi, horum, illorum artuum
 “internodia cruciantes; autum-
 “no, et tempestate pluvia maxi-
 “mopere sævientes, et ad amus-
 “sim rheumatismum simulan-
 “tes.”

It is indeed possible that Dr. Musgrave might not often have seen the colic, in its extreme ill effects, which he mentions as peculiar to the drinkers of cyder ; for, as I am informed, orchards were not in those days much cultivated in the country

near Exeter, where Dr. Musgrave resided : and there was no county-hospital as yet established. Dr. Huxham also testifies in the year 1739, that there was then ten times more cyder made and drunk in the county, than there had been about thirty or forty years before.

But whatever is deficient in Dr. Musgrave, is abundantly supplied by Dr. Huxham. His *opusculum de morbo colico Damno-riorum*, which he first published in the year above mentioned, contains a very full description of this malady. He informs us, that, “in the beginning of the

“ autumn 1724, a season parti-
 “ cularly remarkable for an
 “ abundance of apples, it spread
 “ itself over all the county of
 “ Devon, among the populace
 “ especially, and those who
 “ were not very elegant and
 “ careful in their diet ; and
 “ that, though it may not rage
 “ with the same degree of vio-
 “ lence, and may affect a much
 “ less number of people, yet it
 “ infests that county more or
 “ less every autumn.”

It does not appear, that this
 author began to make observa-
 tions on the air and epidemic
 diseases, until the year 1728,
 that is, four years after the time of

the remarkable epidemic colic of Devonshire. We ought, therefore, the less to wonder, why we have received from him no determinate and uniform evidence whether or not the air had any influence on this disease. In the tenth page of his treatise, we are informed, that “ it was “ *most* violent when northerly “ winds prevailed ;” whereas, in the twelfth page of the same treatise, we find, that “ it was “ *equally* violent in dry and “ moist weather ; during the “ prevalency of a south or a “ north wind.”—And immediately afterwards, “ indeed in a “ dry and cold season, sharp and “ northerly winds blowing, the

“gripping pains were observed
 “to be *most* vehement.”

Any intelligent reader, who shall peruse Dr. Huxham's description, will readily determine the *morbis colicus Damnoniorum* to be precisely the same disease, which, in the year 1617, was described by Francis Citois, a native of Poictiers, afterwards physician to the king of France, and to the cardinal Duke de Richlieu, under the title of *novus et popularis apud Pictones dolor colicus biliosus*. Indeed it seems to be acknowledged by Dr. Huxham himself, that what is called *colica Pictonum*, “which kind of
 “malady,” he says, “is very

“ common in the West-Indies,”
 is similar to the disease which
 he describes ; “ arising from a
 “ similar cause, to wit, too great
 “ an use of the very acid juice of
 “ lemons, and requiring much
 “ the same method of cure.”

Dr. Huxham refers the cause
 of the Devonshire colic principally to a very gross, essential acid salt, or tartar, with which the * expressed juice of apples,

* There was such an abundance of apples in the year 1724, that vast quantities of them were thrown to the hogs : “ But the
 “ swine-hogs, as well as the swine-men,
 “ suffered from the gluttonous abuse of the
 “ apples ; and all of them wasted greatly in
 “ their flesh, and many died.” *Treatise on the Devonshire colic, page 13.* Whether or

whilst unfermented, abounds. He thinks that “ by long and
 “ frequent drinking a liquor of
 “ this kind, such a quantity of
 “ crude, gross tartar is thrown
 “ into the blood, that it thence
 “ becomes very acrid ; and not
 “ only the blood, but from that
 “ impure source, all the hu-
 “ mours thence secreted. So

not the swine-hogs, who thus suffered by *the apple diet*, were affected with the colic of Devonshire, we have no information. If they really were thus affected, such an observation would greatly help to establish Dr. Huxham’s opinion with respect to the cause of this disease. That it is not confined to the human species, is very certain ; for it is well known that dogs and cats, those especially who live in the houses of painters, are particularly subject to it.

“ that instead of a very soft, lu-
 “ bricating *mucus* separated by
 “ the glands, discovered by Dr.
 “ Havers, we have as it were
 “ a sharp, coagulated matter,
 “ whence arises a great pain in
 “ the joints, and impotence of
 “ their motion.—Instead of an
 “ exceeding soft lymph to mois-
 “ ten the nerves, a corrosive
 “ ichor ; and hence epileptical
 “ attacks. Moreover, the blood
 “ being saturate with such a
 “ great quantity of salts, they
 “ attract one the other strongly,
 “ and form greater *moleculæ* than
 “ can pass through the lymphatic
 “ arteries, scarce indeed
 “ through the sanguineous ca-
 “ pillaries ; hence various ob-

“structions, and great irritation
 “on the nervous extremities.
 “At length even the very bile,
 “that variously-useful balsam
 “of the body, becomes corrup-
 “ted and quite enervated by
 “the super-abundant apple-acid,
 “though in its natural state it
 “was designed to correct acidi-
 “ty. The power of the bile
 “being thus destroyed, and
 “being turned almost into a
 “*coagulum*, it stagnates in the
 “gall-bladder, and hepatic ducts.
 “But, being exposed to the
 “heat of the body, and agi-
 “tated by the motion of the cir-
 “cumjacent parts, it is again
 “dissolved, and grows daily
 “more and more thin and acrid.

“ The acid salt added, though it
“ might otherwise, in some
“ measure, temperate the alca-
“ line acrimony of the bile, yet,
“ being continually agitated by
“ the heat and vital actions of
“ the body, at length even in-
“ creases the acrimony. In
“ this dissolved state, the bile,
“ whether green or black, is
“ either resorbed into the blood,
“ or thrown into the intestines.
“ When mixed with the blood,
“ it occasions pains, anxieties,
“ and spasms: besides, it cor-
“ rodes the tender vessels, and
“ is greatly injurious to the
“ brain. When it passes into

“ the guts, it occasions vomit-
 “ ing and colic.*”

* Much is said by Dr. Huxham concerning the origin of the black and porraceous bile: upon a presumption, that the acid, which he supposes to be predominant in the blood of cyder-drinkers, has a power of making those changes in the bile, even when first secreted. That acids, in the first passages, will make the bile porraceous, is very certain: but when *those who are conversant in anatomical dissections have found black and porraceous bile in the gall-bladder and biliary ducts*, they have not always agreed with Dr. Huxham in their conclusion; for I could bring several authorities to shew, that such changes in the colour of the bile, in the gall-bladder and ducts, has been referred to a putrid cause; nay, that by some they have been supposed constantly to attend the plague and pestilential fevers; in which cases acidity has not generally been suspected.

This is a short specimen of Dr. Huxham's doctrine, extracted from a translation of his treatise, which was published with his own approbation. For the remainder of his very ingenious theory I shall refer you to the treatise itself ; observing only, that you will there find a sentiment, which is not more true in general, than it is justly applicable on the present occasion—" *Sine experientia vana*
" omnis theoria, bella sit ut-
" cunque."

For although I always pay that deference, which is due, to the authority of this celebrated physician, I have for some

time conceived doubts concerning the solidity of his doctrine. When I consider, that this colic of Devonshire is precisely the same disease, which is the specific effect of all saturnine preparations ; and that there is not the least analogy between the juice of apples, and the poison of lead ; it seems not to me probable that two causes, bearing so little relation to one another, should make such similar impressions on the human body.

But, lead itself being certainly of such a nature, as to be abundantly answerable for all the ill effects, complained of

from the cyder, my thoughts were naturally carried to the search of it ; and well might I expect to find it, in some way or other, combined with that liquor.

No author whom I have had an opportunity of consulting, has given any intimation of having conceived the same suspicion with myself, except only the anonymous author of *Examen d'un livre qui a pour titre T. Tronchin de colica Pictonum*.*

* In consequence of this vague intimation, contradicted by himself, the author of this pamphlet has lately claimed the merit of having been the first, who conjectured, that the colic of Poitou is produced by one

This writer indeed hints in a cursory manner, “ Il est possible, que les vins, dont parle Citois, et les cidres, dont parle M. Huxham, aient été, sans qu’ils l’aient pu découvrir, altérés avec la litharge ou quelque autre matière semblable.”

It is evident, however, from what he afterwards says, in the forty-sixth page, that he was very far from having formed any settled opinion on this subject. “ *Ces trois causes, scavoir la bile, les matières minérales*

simple cause only. In the second volume of the *Medical Transactions*, page 433, the reader will find this claim stated, and the reasonableness of it considered.

“ venimeuses, et les vins verds
 “ et austères, quoique différentes
 “ en apparence, produisent,
 “ malgré ce qu’en peut dire M.
 “ Tronchin, des coliques à peu
 “ près de même espèce.”

But to return to Dr. Huxham. In endeavouring to explain the nature of the apple juice, he is led to a comparison of our cyder with the Rhenish and Moselle wines ; which, he informs us, agree in containing an abundance of crude tartareous salt. And he adds, “ their
 “ native salts seem very near
 “ alike ; and, examined by the
 “ microscope, appear exactly of

“ the same figure.” But how much soever our cyder may agree with Rhenish and Moselle wines in the particular circumstance of containing a large quantity of essential salt, of a similar figure ; no argument, from analogy, will here be valid, unless it can be shewn also, that Rhenish and Moselle wines have ever produced the colic of Poitou, in an unadulterated state. It is indeed certain, that this disease has been common in the countries where those wines are much drunk ; but it is as certain that the merchants have long practised the art of adulterating them with litharge.

I have frequently found in these wines evident marks of a saturnine impregnation.

But, if pure cyder be the cause of this disease, as being an acid, I must here take leave to ask a few questions, which I am at a loss to answer on that principle. Why then is the colic of Poitou very little known in the eastern countries, where the Turks, whose religion obliges them to abstain from wine, drink every day large quantities of a very acid sherbet? Does the experience of jockeys, who, in order to reduce themselves to a certain standard of weight by sweating,

are said to drink largely of vinegar, strengthen such an observation? Do we find it to be true, that children, and valetudinary people, and particularly chlorotic girls, whose first passages abound with acid, are on that account subject to this species of colic? Is not a *diarrhœa* or *cholera*, the ordinary effect of *the immoderate and very long use of the summer and autumnal fruits?* And is it not a common observation, that Must relaxes and liquefies, and, if drunk largely, is apt to produce dangerous fluxes? Does not the passage of Hippocrates, cited by Dr. Huxham, testify, that *γλεῦκος ὑπάρχει καὶ διαχωρεῖ*? What reason can be given, why

the poorer inhabitants of the counties of Worcester, Gloucester, and Hereford, who use, as their common drink, a weak acid cyder, are subject to no such colic? Is it sufficient to reply, that, in Devonshire, the apples do not ripen, among other reasons, because the trees are planted too near to each other; but that, in Herefordshire, and in the neighbouring counties, the trees being more judiciously planted, the fruit is brought to more maturity? Or, that, in the counties last mentioned, the apples are kept till they are rotten, by which means the acid is subdued, and becomes innocent? Is it ratio-

nal to have recourse to *the moisture exhaled from the vast Atlantic ocean*, in order to shew, why the air of Devonshire is unwholsome, and the apples sour? Is it not proved by the experience of the inhabitants of Scotland, that very large quantities of a small beer may be drunk, even in the act of fermentation, without producing an epidemic colic? Why is this disease no longer endemic in the province of Poitou? Is it that the grapes are brought to more maturity, than they were formerly? Has the sun more power now, than in the time of Citois? Is it reasonably to be suspected, that the essential salt of a vi-

nous liquor can raise such tumults in the bowels, whether by corrupting the bile, or otherwise ; when it is vulgarly known even among the workers of the lead mines in Derbyshire, that patients, afflicted with this same disease, do not receive a more immediate, or a more effectual relief from any medicine whatever, than by taking large and repeated doses of this very essential salt, the *cremor tartari* ; and when it appears that Dr. Hillary greatly depended on it, for the cure of the dry-belly-ach, in the West-Indies ? And lastly, can we possibly allow, that a cause, similar in its nature to the acid of

lemons, is productive of this disease in our own country ; after having been informed both from the West-Indies, and the colonies of North America, that the juice of lemons and limes is not only much trusted to for its cure, but that it is even esteemed to be a preservative from it ?

ZELLER, in his *docimasia, signa, causæ, et noxa vini lithargyrio mangonisati*, gives an account of the revival of the adulteration of wine by litharge in the dutchy of Wirtemberg, in the beginning of the present century. In this dissertation he asserts, that though the wines in the neighbourhood of Tubingen, were as

acid as vinegar, the inhabitants had long drunk them with impunity, till this fraud was introduced. “ Constat viciniam
 “ nostram, ubi alias montes la-
 “ crymantur acetum, et istius-
 “ modi vina immatura et acida
 “ per plures annos, imo lustra,
 “ ab incolis et militibus largiter
 “ hausta fuerunt, ab omnibus
 “ tamen his symptomatibus pe-
 “ nitus liberam fuisse, cum a
 “ fuco quoque libera fuerit: imo
 “ in ipsa hac nostra civitate,
 “ quæ ante duo lustra truculen-
 “ tia hac tantum non oppressa
 “ fuit postquam fraudem hanc
 “ plurimi, tam vietores, quam
 “ caupones, tecte quidem exer-
 “ cuerunt, omnes isti, qui a cau-

“ponibus vinum vel non eme-
 “runt, vel in eorum ædibus non
 “biberunt, a torminibus et
 “cruciatibus hisce immunes
 “evaserunt ; licet eorum do-
 “mestici per aliquot annos au-
 “sterum et acidissimum hause-
 “rint vinum, ut acidius gustari
 “vel dari nequeat ; aliis inte-
 “rea, quos dulcedo inescavit,
 “miserrime patientibus, aut en-
 “ervatis, elumbibus redditis,
 “pendulis artibus et resolutis
 “incedentibus, aut neci tradi-
 “tis ; plurimi enim miserrime
 “perierunt.”

There is indeed an experi-
 ment, mentioned by Zeller ;
 but it seems to prove nothing

against the general wholesomeness of acids. Upon his having given to a dog three ounces and an half of very strong vinegar, the respiration of the animal immediately became sonorous and difficult: and he died in the third hour after he had swallowed the vinegar, having thrown up great quantities of froth, which at last was mixed with blood. The dog being opened, no signs of inflammation appeared in the stomach: the mischief is described to have been in the lungs only. Some of the vinegar probably found its way into the lungs; and suffocation seems to have commenced in the very act of swal-

lowing. Whereas Brunnerus, (*Ephemerid. Germanic. an. 4. observat. 92.*) who killed a dog with an ounce of powder of litharge, boiled in vinegar, found the effects of that poison to be principally in the stomach, intestines, urinary bladder, and the other *viscera* of the *abdomen*.

I shall only add one more observation concerning acids. Physicians who have resided some time in the hotter countries, have testified, that there are no better remedies against spasms, dysenteries, and the other endemeal diseases in those climates, than the acid vegeta-

bles, with which nature has most liberally supplied them. This opinion is expressed in a strong manner by Jacobus Bon-tius in his *Historia naturalis Indiæ orientalis*, lib. vi. cap. 27.

“ Videtur Natura voluisse ex
 “ professo multas acidas et con-
 “ stringentes herbas e terra
 “ producere, contra violentos
 “ et endemios morbos, dysente-
 “ riam nempe, choleram, et
 “ spasmum, plerumque a bile
 “ ortos: ut quasi digito mon-
 “ straret, ubi hæc vel similia
 “ mala nascuntur, ibi locorum
 “ remediorum manifesta et eti-
 “ am occulta qualitate pugnan-
 “ tium penuriam non fore.”

It seems therefore, upon the whole, not to have been without sufficient foundation, that I had for some time suspected, that the cause of this colic was not to be sought for in the mere acid cyder ; but in some adventitious, either fraudulent, or accidental, adulteration with lead.

Upon inquiry into the state of the disease, I found that it is very common all over the county of Devon : but that it particularly infests those parts of the county, where the greatest quantities of cyder are made. I likewise found that it is not only common among the lower

class of inhabitants, and those who drink largely of the unfermented juice, and the new cyder ; but that it is much more frequent among people of all ranks than in other parts of England ; and that it is far from being entirely confined to the autumnal season. Not long ago I had an opportunity of seeing several wretched victims to this cruel disease ; who answered to the representation drawn by Citois. “ *Per vicos,*
“ *veluti larvæ, aut arte progredientes statuæ, pallidi, squal-*
“ *lidi, macilenti conspiciuntur,*
“ *manibus incurvis et suo pondere pendulis, nec nisi arte*

“ ad os et cæteras supernas par-
 “ tes sublatis, ac pedibus non
 “ suis, sed crurum musculis,
 “ ad ridiculum, ni miserandum,
 “ incessum compositis, voce
 “ clangosa et strepera.”

I lately received from Dr.
 Andrew of Exeter the follow-
 ing account of all the patients,
 under this disease, received
 into the Devon and Exeter
 hospital since September 1762.

From Sept. 1762 to Sept. 1763	-	-	72
Sept. 1763 to——1764	-	-	75
Sept. 1764 to Lady-Day 1766	-	-	86
Lady-Day 1766 to July 6, 1767	-	-	52
			<hr/> 285 <hr/>

Of this number 209 were cured.

Dr. Andrew likewise instructs me that patients are brought to the Devon and Exeter hospital from all parts of the county ; but chiefly from those parts, where most cyder is made.—That the most violent symptoms of this disorder, such as pain and costiveness, are generally removed before the sick are brought to the hospital ; and that nothing commonly remains but a paralytic weakness in the arms. He adds, “ I
 “ have known this complaint
 “ cured radically ; though, I
 “ confess, a return often happens. When the disease
 “ proves obstinate, we always
 “ endeavour to get our patients

“ into the hospital at Bath : the
“ Bath water, though not a spe-
“ cific, being esteemed by us
“ the most effectual remedy,
“ both internally and externally
“ used.”

Upon farther inquiry, I find that eighty patients, under the effects of the Devonshire colic, were received into the Bath-hospital in the course of the last year ; forty of whom are said to have been cured, and thirty-six sent away greatly relieved. I am assured likewise from that hospital, that the proportion of such patients sent from Devonshire, to those from the counties of Hereford,

Gloucester, and Worcester, is generally as eight to one.

In some letters, which I have lately received from Dr. Wall of Worcester, the following facts are asserted. “ The
 “ counties of Hereford, Glou-
 “ cester, and Worcester, are
 “ not, so far as I know, sub-
 “ ject to the colic of Poitou, or
 “ any other endemic illness,
 “ unless it may be the rheuma-
 “ tism ; which, I think, the
 “ inhabitants of Herefordshire
 “ are more liable to, than
 “ those of some other counties.
 “ There is no lead, which can
 “ give occasion to that colic,
 “ used in any part of the *appa-*

“ *ratus* for grinding or pressing
 “ the apples, or fermenting the
 “ liquor. Once indeed, in a
 “ plentiful year of apples, I
 “ knew a farmer, who, wanting
 “ casks, filled a large leaden
 “ cistern with new cyder, and
 “ kept it there, till he could
 “ procure hogsheads sufficient
 “ to contain the liquor. The
 “ consequence was, that all,
 “ who drank of it, were affec-
 “ ted by it as lead workers usu-
 “ ally are. We had eleven of
 “ them, at one time, in our in-
 “ firmary.

“ I have lately had two or
 “ three patients in that distem-
 “ per, occasioned by their hav-

“ ing drunk cyder made in a
 “ press covered over with lead.
 “ But this fact of a cyder-press
 “ covered with lead, is a singu-
 “ lar, and perhaps the only in-
 “ stance of the kind in this part
 “ of England. It happened in
 “ a part of the county of Wor-
 “ cester, adjoining to Warwick-
 “ shire, where very few apples
 “ grow ; and the bed of the
 “ press being therefore cracked
 “ by disuse, the sagacity of the
 “ farmer contrived this cover-
 “ ing, to prevent a loss of his
 “ liquor. In general, the cy-
 “ der-drinkers with us are heal-
 “ thy and robust ; but for the
 “ most part lean. The liquor
 “ is clear, and passes off readily

“ by urine and perspiration ;
 “ which enables the common
 “ people to drink immense
 “ quantities of it when at la-
 “ bour, to the amount of several
 “ gallons in a day. I have
 “ heard it observed by a physi-
 “ cian, late of this place, who
 “ was much employed in the
 “ cure of lunatics, that more of
 “ those unhappy persons came
 “ to him from Herefordshire,
 “ than any other place. The
 “ fact, if true, may possibly
 “ arise from the quantity drunk
 “ rather than the quality.”

Were the *apparatus* for mak-
 ing cyder the same in all the
 cyder-counties, it would ap-

pear, at first sight, very unaccountable, that the inhabitants of one county in particular, should experience such terrible effects from the use of this liquor, while those of the others drink it with impunity. But if we examine the several methods of making cyder in the different parts of the kingdom, and the utensils employed in it, we shall be able to conclude, with a strong degree of probability, what, at least in part, occasions such a remarkable difference.

Dr. Wall informs me, that in some parts of the counties of Hereford, Gloucester, and Wor-

cester, the mills, in which the apples are ground, being sixteen eighteen, or twenty feet in diameter, consist of several pieces of stone or timber, joined together by means of iron cramps, fastened with lead : but, that these cramps are fixed only in the *bed* of the mill, or on the outside of the curb ; and not in the groove, where the apples are ground. The same gentleman, however, observes, that, if many apples, full of juice, are suffered to lie long on the bed of the mill (where they are usually placed in an heap, in readiness for the groove) some of which may perhaps be rotten, others bruised in the gathering,

and a moisture spread over the whole, from the fermentation and sweating of the fruit, it may perhaps be doubted, whether some parts of the lead, used in the cramps, may not be dissolved ; though it must be, at most, in a quantity extremely small ; there being but very little lead used in the junctures ; and the surface, exposed to the fruit, being almost imperceptible. But I am informed by another person, that, in many parts of Herefordshire, and the neighbouring counties, the stones composing the mills, are joined together with a putty ; which putty is no other than a mixture of oil and whit-

ing; and that neither iron nor lead are originally used in the construction of them. However, if any of the joints, in wearing, happen to start, it is admitted, that they are repaired with iron cramps, fastened with lead.

In many parts of the county of Devon, the circular trough, used in grinding the apples, is composed of several pieces of moor-stone, cramped together with iron, and fixed by melted lead, poured into the interstices, on the inside of the groove. These stones are not always wrought with much art; and sometimes, being of irregular and

unequal figures, they do not correspond with each other ; so that considerable chasms are left between them ; and these chasms are filled up with lead. The apples therefore, ground by the pressure of the roller, come immediately into contact with no small quantity of this poisonous mineral. I have heard only of one trough, which is made of a single stone.

It is likewise common, in several parts of the county, either to line the cyder-presses entirely with lead, in order to prevent their leaking ; or to make a border quite round the press for receiving the juice of the

apples; and conveying it into a vessel, of wood or stone, placed underneath. In many other places, it is common to nail sheet lead over any cracks or joints in the presses ; and likewise to convey the juice from the presses in leaden pipes.

When I first entered upon this enquiry; I was of opinion that whatever mixture of saturnine parts there might be found in the cyder of Devon, it was wholly to be referred to the accidental use of that metal in the troughs and presses. I had indeed been informed, that it is the practice of some farmers, in managing their weak cyder,

made early in the year, before the apples are ripe, to put a leaden weight into the cask, in order to prevent the liquor from being sour ; and that this cyder is the common drink of their servants and labourers. But I was willing to believe, that such a pernicious method of adulteration (a crime, which both in France and Germany is punished by death) was not often practised by our countrymen. That it is not practised with any consciousness of the mischief of it, I still hope and believe. But it is certainly common with dealers in cyder, when the liquor frets too much, and is thereby in danger of be-

coming acetous, to rack it into a leaden cistern*. And I have good authority to add, that even the use of cerusse, in correcting acidity, is well known by the farmers and merchants.

I was in hopes, that a custom, to which Mr. Phillips alludes in his excellent Georgic, had subsisted only in the imagination of the poet :

—“ nor let the crude humours dance
 “ In heated brass, steaming with fire intense ;
 “ Although Devonian much commend the use
 “ Of strengthening Vulcan.”

* I have lately been informed that this method is likewise practised in Herefordshire.

But I have received very positive information, that it is a common practice in Devon, to boil the juice of the apple before fermentation, with a view to increase the strength of the cyder, and to prevent its advancing to the acetous state. This custom seems to have been first introduced, in imitation of the management of wine in some countries ; where, we are informed, it is usual to boil the unfermented liquor with the same intention.* According to the testimony of Neuumann, the strong full-bodied, rich, sweet wines, such as the malm-

* This method of managing wine ap-

sey, canary, and some of the Spanish and Hungarian wines are generally a mixture of fermented and inspissated Must, the latter being added to increase the richness of the liquor, and prevent the fermentation from running beyond its due limits. And we are informed by the same author, that several of the Italian wines called by the general name of

pears to have been very antient. We meet with several allusions to it in Virgil :

“ Aut dulcis musti Volcano decoquit humores

“ Et foliis undam trepidi despumat aheni.”

Georg. lib. i. ver. 29

And in Georg. lib. iv. ver. 269.

—“ Igni pinguia multo

“ Defruta.”

Columella is copious on this subject

vini cotti, by means of decoc-
tion, continue fit for drinking
a year or two, although they
have suffered scarcely any de-
gree of fermentation, and are
little more than boiled Must.
This process is only applied to
thin watery juices, extremely
prone to ferment, and which
fermentation, when once be-
gun, can scarcely be suppres-
sed, till it has run beyond the
vinous state.

Hoffman accounts for the
strength and sweetness of many
of the wines of Italy, in the fol-
lowing manner. “ Dependet
“ dulcedinis, nec non virium
“ causa potissimum ex eo, quod

“ in more habeant vel ex
 “ uvis maturis selectis in
 “ aëre parumper exsiccatis ea
 “ præparare, vel ipsa recentia
 “ musta igne leni aquositate in
 “ auras emissa inspissare, et
 “ tunc fermentationi exponere.
 “ Hoc artificio vina majorem
 “ acquirunt dulcedinem, quan-
 “ doquidem, mustum quo dulci-
 “ us et spissius est, eo minus
 “ vehementem subit ebullitio-
 “ nem, quæ alias plerumque
 “ aciditatis nimix genitrix est.”
 (*De præstantibus Europæ vinis,*
cap. i. art. xi.)

It will very easily appear,
 how this method of boiling the
 Devonshire Must does necessa-

rily expose it to an impregnation of lead. It is customary in almost every country, to make the upper parts of the boiling vessels of lead ; as the capacity of the vessel may be thus increased, at a less expense, in the part where it is not exposed to the fire. In the state therefore of ebullition, the mere vapour of the acid Must, although the liquor be not supposed to reach up to the lead, will certainly dissolve the metal ; and, in the state of sugar of lead, it will trickle down the sides of the vessel, and be united with the boiling juice. Here then we discover an additional reason, why the liquor,

heated in this manner, should have its fermentative quality restrained, and should acquire an artificial sweetness. It is well known, that, a few years ago, this very practice produced *the Devonshire colic* in the county of Kent. Some cyder, which had been made in a gentleman's family, being thought too sour, was boiled with honey in a brewing-vessel, capped with lead. All, who drank this liquor, were seized with this disease ; some more, others less violently. One of the servants died very soon in convulsions ; several others were cruelly tortured a long time. The master of the family in particular,

notwithstanding all the assistance which art could give him, never recovered his health; but died miserably, after having, almost three years, languished under a most tedious and incurable malady.

There is at this time, or at least there very lately was, on an estate belonging to His Grace the Duke of Somerset, in the parish of Bury Pomeroy, a leaden cistern of very large capacity. During many years, as I am credibly informed, the juice of the apple, as soon as expressed, was conveyed to this cistern, and remained in it, until it was fit to be removed

into casks. At last it was discovered, that this was a most pernicious practice ; for that those, who drank the cyder, thus prepared, were most cruelly tormented by the Devonshire colic ; and that many died. The leaden cistern therefore was no longer used ; and, in consequence, the disease became less frequent among the inhabitants of Bury Pomeroy.

I have frankly been informed by a gentleman of the county of Devon, that it has been a custom, long practised in his own family, to restrain the fermentation of cyder, by throwing into it a certain quantity of su-

gar of lead ; but he is by no means convinced, that any ill consequences ever followed this practice ; and he insists that his family are not more subject to the colic, than their neighbours.

It is very certain, that, in various parts of the county of Devon, there are those, who possess certain secrets for the management of cyder ; the general object of which secrets is, to correct the sourness and austerity of that liquor. Indeed, there is great reason to fear, that pernicious methods of adulterating vinous liquors are too well known, and too much practised

in every part of this kingdom. I have several times discovered marks of a solution of lead in the English *made* wines. In a small *compendium* of housewifery, intituled, *The art of making wines, from fruits, flowers, and herbs, all the native growth of Great Britain*, by William Graham, late of Ware in Hertfordshire, under the article of *Secrets belonging to the mystery of Vintners*, page 30, I have lately found the two following receipts.

“ *To hinder wine from turning.*

“ Put a pound of melted lead
 “ in fair water into your cask,
 “ pretty warm ; and stop it
 “ close.”

“ *To soften green wine.*

“ Put in a little vinegar,
 “ wherein litharge has been well
 “ steeped, and boil some honey
 “ to draw out the wax. Strain
 “ it through a cloth and put a
 “ quart of it into a tierce: and
 “ this will mend it, in summer
 “ especially.”

This little book, having gone through six editions, may be supposed already to have done some mischief: and the editor of it would act humanely, if he would, in future editions, not only suppress the secrets of the mystery of vintners, but shew how dangerous such receipts

may be to the health of mankind.

I determined, therefore, to make use of the first opportunity, which might occur, of satisfying myself by experiment, whether or not there might be in fact any solution of lead discovered in the cyder of Devonshire. Happening to be, in the month of October 1766, at Exeter, I procured some of the expressed juice of apples, as it flowed from a cyder-press, lined with lead, in the parish of Alphington. On this I made and repeated several experiments, by means of the *atramen-*

tum sympatheticum or *liquor vini probatorius* ; and of the volatile tincture of sulphur. The experiments satisfied me, that the Must did contain a solution of lead. The same experiments were made on some cyder, made in the parish of Alphington, of the preceeding year. This likewise shewed evident signs of lead contained in it ; but in less proportion than in the Must.

But, being unwilling to come to any decisive conclusion, solely on the authority of my own trials ; more especially as I had been under the influence of a preconceived opinion ; I

brought with me to London some of the same Must, which I had examined at Exeter, in a vessel of stone-ware. This Must, together with some Devonshire cyder of the preceding year, purchased of the maker (who assured me that he used no lead in any part of the *apparatus*, except only what was applied in composing the trough, as was mentioned above) were the subject of the five first experiments, which will hereafter be described. In making these, as well as several others, on the same subject, Dr. Saunders kindly gave me his assistance.

Before that I give an account of the several experiments, which we made, it may be proper to make an observation or two, which will perfectly explain the mode of union, which takes place between wine or cyder, and lead.

The expressed juice of the ripe grape, or ripe apple, contains a considerable quantity of acid, united with a sugar. This acid having undergone the saccharine fermentation, the whole is gradually converted into an alcohol or inflammable spirit. But if the original juice, or Must, be crude and acid, without having much saccharine

matter in it, the native acid is with difficulty assimilated ; or, when it arrives at the proper period of assimilation, it does not remain there stationary, but hastens on to the acetous fermentation. When lead is added to such wines, or cyders, their acidity is covered ; a sweetness is communicated to them ; and their progress to the acetous fermentation is checked.

The richer wines, of which the original juice contains a large proportion of saccharine matter, are less liable to adulterations of this kind, than the poorer wines of northern climates, such as the Rhenish and

the Moselle wines, and our English cyder.

It is farther to be observed, that the vegetable acid, either in its native state of Must, or in its fermented state of vinegar, or in its intermediate state of cyder, very readily receives an impregnation from lead, whether it be applied in form of metal, or of *calx*. We are therefore to consider lead, when united with wines, as in the condition of *saccharum saturni*.

By attentively observing the variety of changes produced by certain bodies, when added to a solution of *saccharum saturni*;

and by applying these observations to the wines, which are the most frequent subjects of this adulteration, chemists have been enabled to detect such frauds, wherever they have existed. We now proceed to our experiments.

EXPERIMENT I.

A small quantity of Devonshire cyder being exposed upon clean paper to the fumes of the volatile tincture of sulphur, became immediately of a darkish colour. And we could only imitate this colour by exposing a dilute solution of *saccharum saturni* to the same fumes. A small quantity of Herefordshire cy-

der, exposed in like manner to the same fumes, exhibited no such appearance, until a few drops of a solution of *saccharum saturni* were added to it.

OBSERVATION I.

From this experiment we are to understand, that the acid, before united with the lead in the cyder, and the volatile alkali in the tincture of sulphur, mutually attracted each other ; and that it was the precipitate of the lead, united with the sulphur, which produced the dark colour above-mentioned.

EXPERIMENT II.

A small quantity of *hepar*

sulphuris (prepared by digesting together in a sand-heat one ounce of orpiment, and two ounces of quick-lime, with twelve ounces of water, in a close vessel) being added to some Devonshire cyder, in a few minutes occasioned a darkish colour in the body of the liquor ; and the whole became very opaque. No such change was produced in the cyder of the county of Hereford, until a few drops of a solution of *saccharum saturni* were infused ; when the same appearance likewise was perceived.

OBSERVATION II.

The reasoning, made use of

in the former observation, is applicable here. The decomposition of the *saccharum saturni* and of the *hepar sulphuris* was effected by the same laws of elective attraction.

EXPERIMENT III.

To a small quantity of Devonshire cyder a few drops of *hepar sulphuris* (prepared by boiling equal parts of fixed vegetable alkali and sulphur together in water) were added ; and a precipitation of a very dark colour was produced.

When Herefordshire cyder was treated in the same manner, the precipitate produced was as

white as milk; and it was only upon the addition of a few drops of a dilute solution of *saccharum saturni*, that a precipitate of the same colour with the former could be obtained.

OBSERVATION III.

There is some nicety required in making this experiment. The *hepar sulphuris* is not to be added in any large quantity : for, as all the lead is precipitated, upon the first addition, it is easy to perceive the several successive shades of colour in the precipitate, until all the lead is separated ; and then the precipitate, upon a farther addition of *hepar sulphuris*, as-

sumes the whiteness of the precipitate obtained from the Herefordshire cyder, which intitles it to the appellation of *lac sulphuris*. If a large quantity of *hepar sulphuris* be at once added the whiteness of the too copious precipitate is such, as to render the dark colour of what is first precipitated imperceptible.

EXPERIMENT IV.

Some Devonshire cyder was examined by means of the volatile tincture of sulphur, as in Experiment III: and a very dark coloured precipitate was obtained. A similar precipitate could not be obtained from

Herefordshire cyder, until a weak solution of *saccharum saturni* had been added to it.

Some of the Must (taken from the press in the parish of Alphington) treated in the same manner, produced precipitates of a deeper dark colour. This sufficiently shews, that the solution of lead in the Must, was stronger than that in the cyder.

It is a matter of no consequence, whether the lead, the existence of which is proved, was applied to the cyder in its state of Must, or in that of a vinous liquor. However, as the Must afforded more considera-

ble signs of impregnation than the cyder, it should seem probable, that the lead was incorporated with the Must ; and that, as the acid, during the fermentation, is in a great measure converted into alcohol, a proportional quantity of lead would necessarily be precipitated.

The same experiments were afterwards tried on several other specimens of Devonshire and of Herefordshire cyder, from the cask as well as the bottle. The result of them was constantly and uniformly the same as has been described, except only in three or four instances. Three bottles of diffe-

rent kinds of the former shewed no signs of having been impregnated with lead ; and one of the latter, which I very lately examined, gave a darkish precipitate.

It has been proposed by several authors, to detect such adulterations of wines by means of the vitriolic, or of the muriatic acid ; which, by uniting with the lead, will make it precipitate. But it is ascertained, by the experiments of Professor Gaubius, that trials made with the acids, are less conclusive than those which have been described.

EXPERIMENT V.

In order to put the matter entirely out of doubt, an extract was made from eighteen common quart bottles of Devonshire cyder of the preceding year, (first strained through a linen cloth) which had been in my cellar more than three months, but had been only a fortnight in bottles. This extract, being assayed with the black flux, a quantity of lead, weighing four grains and an half, was found at the bottom of the crucible.*

* As a doubt has arisen concerning the validity of this fifth experiment, I shall lay

EXPERIMENT VI.

Two pounds of pearl-ashes were dissolved in water ; and the solution, having been filter-

before the reader every circumstance relating to it. Two small granules of lead having been observed in a former extract, which was made from eighteen bottles of Devonshire cyder, it was immediately suspected, that these granules could be no other than *shot*, used for the purpose of cleaning bottles and left in them by accident. This extract was therefore thrown away : and the cyder, used in the fifth experiment, was strained through a cloth, in order to prevent a possibility of any *shot* being found in the extract. Dr. Saunders informed me that, in the cloth through which the liquor had passed, there were two or three such granules of lead. Therefore in order to determine, whether or no the cyder, which had been the subject of

ed, was added to three gallons of Devonshire cyder, drawn from a cask. The liquor be-

our experiments, owed its saturnine impregnation to this accidental cause, the tests were applied, in the manner before mentioned, to some of the same cyder, taken from a bottle, which, we were sure, had not contained any *shot*: for the bottle was very carefully examined, after having been broken in the presence of several gentlemen. The change of colour, on the application of the tests, was precisely the same, as in the former experiments.

However, in order to obviate all cavil, another experiment was made. The first part of this sixth experiment, namely, what relates to the precipitation and filtration, was performed intirely under the direction and management of Mr. Hewson. The latter part was performed by Dr. Saunders, in the presence of Mr. Hewson, and of Dr. Ruston.

came turbid, shewing marks of a precipitation. It was then filtered: and the filtering papers, together with the powder, which was left on them, were burnt in a brass mortar, and afterwards burnt in a crucible, being stirred with an iron spatula in order to promote the union of the particles. The contents of the crucible were then exposed on a sheet of clean paper, and were carefully examined. Some very small globules were here found; which, being melted in a clean crucible, were reduced into one mass, which was evidently malleable lead. The quantity was a little more than one grain.

In order to determine, what proportion *saccharum saturni* bears to lead, the following experiment was instituted.

Four ounces of *saccharum saturni* being put into a retort, and a receiver being applied, there were distilled over about one ounce and an half of an oily acescent liquor. The remainder being exposed, with a small quantity of *phlogiston*, to a degree of heat sufficient to melt lead, one ounce and seven drachms of malleable lead were obtained.

In the latter end of the last century, when the physicians

of Germany (particularly Vicarius, Cockelius, and Brunnerus, whose dissertations on this subject may be found in the *Ephemerides Germanicæ*) had taken great pains to discover the true cause of the epidemic colic, which, to use the language of Brunnerus, (*Dec. 3. an. 4. observat. 92.*) “non magis ægrotantium
 “ viscera, quam medentium animos, torserat ;” and when they had at last demonstrated that this disorder was wholly to be referred to small acid wines, adulterated with litharge, there appeared a certain writer, a physician of Copenhagen,*

* It is recorded of this physician, whose

who endeavoured to exhibit a specimen of his reading and ingenuity, by maintaining a bold paradox. This man, in very pompous language, and with an air of the greatest con-

name was Seerup, that, although, in reality a man of very moderate parts, and less learning, he, by means of a certain authoritative, over bearing, dictatorial manner, both in his writings and common conversation, passed among many of his countrymen and some foreigners, as a person of the most extraordinary abilities, and a perfect oracle in physic: that, thus flattered, he grew old in error and in obstinacy; his vanity and self-importance never suffering him to abandon any opinion, which, through ignorance and inexperience, he had once adopted. It is no wonder, therefore, that the reputation of this man's writings did not long survive the author.

fidence, asserted in his *Triumphus Lithargyriatorum*, that no danger was to be apprehended from wines in which litharge was dissolved ; and that all the ill effects, supposed to have been derived from that cause, were really to be attributed to the austere acid of wine made of unripe grapes. This opinion he endeavoured to defend by the authority of Drawitzius, Sennertus, Van Helmont, Theodorus Zwinger, Wepfer, Boyle, and several other writers. He likewise quoted many authors, to shew the salutary effects, produced in the human body by the internal use of lead ; and insisted, in virtue of

their testimony, that it had cured affections of the spleen, arising from an acid cause ; the hypochondriacal disease ; sudden inflammations ; colics occasioned by the *bilis æruginosa* ; obstinate quartan fevers ; ulcerations of the lungs, as well as of other parts ; and the plague itself. He brought other authorities to shew, that the *aqua saturni* had been of very great use in disorders occasioned by worms ; that the *spiritus saturni* had cured the leprosy ; that Paracelsus held it to be a specific remedy in madness ; and that in the small pox, and all other inflammations, it had been proved to be an efficacious medicine ; that

it was the great sudorific medicine of Faber ; that it was Mynsicht's secret for the cure of *phthisis*, and diseases of the spleen and colic ; that the great success, which had attended the practice of Petrus Matthias, was to be ascribed to the use of *saccharum saturni* ; and other preparations of lead : and, lastly, that a constipation of the belly could not justly be attributed to *saccharum saturni* ; since Antonius de Heide asserts, in his medical observations, that he cured that disorder by administering to his patients five grains of it mixed with crabs-eyes.

But it is presumed that, the

presence of lead in the cyder of Devonshire being demonstrated, there is no one, at this time of day, likely to revive the argument of Seerup, and still to insist on the deleterious quality of the acid : for a poison is discovered, which is experimentally known to be adequate to all those dreadful effects so pathetically described by Dr. Huxham. It is likewise presumed, that no opinion, unsupported by facts, by experience, or analogy, (how respectable soever the character of its author may be) will be admitted in evidence, in contradiction to the authority of a fact, for which we have the

decisive and indisputable testimony of our senses.

The general character of lead, and of the preparations of lead, when given internally, has been, that they cool ; incrasate ; repel ; absorb, and obtund acrimony. And it is very well known, that their real power has, in many instances, seemed to answer to such a general character ; for there are scarcely any medicines, which produce their effects more immediately, or with greater certainty, in colliquative sweats, in fluxes, and in hæmorrhages. But it is as well known, that the relief given, which, for the

most part, is only temporary, has been frequently followed by violent pain in the bowels, obstinate costiveness, suppression of urine, tremors, spasms, palsy, asthma, and suffocation. And although, if we give credit to the testimony of credible writers, we must allow, that patients, of certain constitutions, may have taken these medicines with success, and with impunity ; yet surely physicians cannot be too cautious in avoiding the use of medicines, the effect of which, for aught that they can presume to ascertain, may be more formidable than the very diseases to which they are opposed,

That preparations of lead were formerly very fashionable medicines, we may judge from the oldest dispensatories; in which we find an almost infinite number of magisteries, elixirs, and balsams, that have that metal for their *basis*. We are informed by Mr. de Haen, that the use of these medicines is much more common even now, than is generally imagined. He thinks that the number of patients, affected by the colic of Poitou, is immensely increased by such means. He mentions the *formula* of a medicine compounded of one scruple of *saccharum saturni*, one drachm of cerusse, and six ounces of

water. By this medicine, taken *cochleatim*, a patient, he says, was cured of a *gonorrhæa* ; but he was soon afterwards seized with the most excruciating pain in his bowels, followed by a vomiting of his excrements. He adds, that this man, though he escaped death, did, even so long as three years after, lament the reliques of that most dreadful cure. I could quote from my own experience more than one instance, in several respects similar to this which I have taken from Mr. de Haen's *Ratio Medendi*.

What then can we think of the practice of the Chinese, who

very frequently administer internally various preparations of lead, to which they ascribe extraordinary virtues? The observation, made in this respect by Mr. Malouin, in his *Chymie medicinale*, seems judicious. “ En
 “ réfléchissant sur l’usage inté-
 “ rieur que les Chinois font du
 “ plomb, on est porté à croire
 “ que ces peuples sont diffé-
 “ remment construits ou tempé-
 “ rés ; ou que leur plomb dif-
 “ fère du nôtre.”

Dr. Huxham finds it difficult to allege the reason, “ why the juice of apples in one year produces a costive belly, with violent colical pains ; in ano-

ther, a loose belly with scarce any gripes attending." Now I have been informed by others, that small quantities of new cyder will frequently produce a *diarrhœa* in any, and in every year. And Citois observes, that the colic, which infested the inhabitants of the province of Poitou, was often attended, "per initia præsertim, cum
 "alvi frequenti, sed non ita copioso, fluore, sæpius cum ejusdem adstrictione." M. Doazam, who writes on this disease in the *Journal de Médecine* for the month of October, 1760, affirms that "Il en est plusieurs, qui
 "non seulement n'ont point
 "éprouvé de constipation, mais

“ même qui se sont plaints d'un
 “ flux de ventre.” The same
 thing is sometimes observed in
 the case of painters, and of
 other workmen employed about
 lead. Some of them are cured
 by a spontaneous looseness of
 the belly. Mr. James Wilson,
 in the *Essays and Observations*
physical and literary, published
 at Edinburgh, Vol. I. Art. 22.
 gives an account of a disease,
 called by the miners Mill-reek,
 which all the inhabitants of
Lead-Hills are subject to, but
 particularly those, whose daily
 business it is to melt down the
 lead ; and he observes, that, in
 the first stage of this disease, a *di-*
arrhœa sometimes makes a cure.

A question may be asked,
 “ If the mischiefs occasioned
 “ by cyder, particularly when
 “ it is new, arise from the poi-
 “ son of lead dissolved in it,
 “ how happens it, that all, who
 “ drink this liquor, do not suf-
 “ fer in proportion to the quan-
 “ tity of the poison swallowed;
 “ and that some people, who
 “ have long accustomed them-
 “ selves to it, have never ex-
 “ perienched any of its bad ef-
 “ fects.” This difficulty, which
 subsists in its full force, what-
 ever general cause be supposed,
 I do not take upon me to ac-
 count for: possibly it is re-
 solveable only by recurring to
 that inexplicable *idiosyncrasia*,

in which there is so remarkable a difference among men. Be it remembered, at the same time, that the case is not singular, but exactly paralleled by that of the foreign wines ; and that the physicians of Germany, who in the latter end of the last, and in the beginning of the present century, wrote concerning the adulterations by litharge, found reason to make the same observation. The words of Zeller are, “ Multi
 “ tamen, imo innumeri ab eo
 “ læsi non fuerunt, utut ad
 “ ebrietatem usque illud hause-
 “ rint ; alii leviter tantum.”

I shall only add, that it will

not be easy to determine the exact quantity of lead dissolved and incorporated with cyder, unless an essay be made soon after the adulteration has been received. For it seems probable, that, as was the case of the German wines, which, after a few months, lost that apparent but pernicious, improvement, which fraud had given them, the cyder also may, in some time, deposit the greatest part of its poison. But that a very small quantity of this poison is capable of producing most terrible effects is certain also from what was formerly observed. For, a calculation having been made, according to the method of

adulteration described by Cockerelius, it was found, that a measure of wine, called *mensura Wirtenbergica major*, which Reiselius estimates at sixty-four ounces, scarcely contained half a grain of litharge.

POSTSCRIPT.

WHEN I first undertook the unpopular task of exposing what appeared to me to be a most dangerous provincial error, I was well aware, that much cavil and contradiction was to be expected ; and that it would be very difficult to establish a truth, however clearly demonstrated, in opposition to the prejudices, the passions, and the interests of men. I have accordingly heard of several objections, made to my opinion ; some of which are founded on

false facts, and misrepresentation ; others have indeed, at first sight, a specious appearance ; but, when submitted to a more accurate examination, seem to lose all their validity, and importance. In hopes of preventing any farther disputation on this subject, I have stated the principal objections ; and have subjoined my answers to each of them.

It is affirmed, that, in many parishes of Devon, the mode of compressing the apples, which I have described, is gone into disuse ; and that, instead of the trough and roller, a machine, commonly called the *mill-engine*,

or *the hand-engine*, is employed for that purpose. This is admitted to be a fact ; particularly in the eastern parts of the county. But I have received clear information from several persons of credit, that, although no lead enters the structure of that machine, yet the vessel, placed to receive the apples, ground by it, is, in several parishes, lined with lead. As often as such a vessel is used, there can be no reason to imagine, that the danger, arising from lead, is removed by *the mill-engine*, substituted to the trough and roller.

It has been suggested, that the apples are frequently com-

pressed in wooden troughs. Having made a very strict inquiry, I do not find, that troughs, made entirely of wood, are now in use ; the stone-troughs, having been experienced to be more convenient. I find indeed, that the stone-troughs are generally enlarged round the top with wood ; and that the two parts are joined together by means of long iron nails, driven through the wood into the stone ; and that melted lead is poured into holes in the stone, made for its reception, with a view to fasten the junction.

It is denied, that sheet-lead

is nailed over any press in the county, one at Alphington excepted. To this I reply, that, in the year 1766, there were in several parts of the county, cyder-presses lined with lead. I am authorized to mention several parishes in the South-hams, where such presses were then used. But in the three parishes of Ide, St. Thomas, and Alphington adjoining to, and intermixed with each other, not fewer than thirty presses, lined with sheets of lead, were to be found.

An experienced physician informs me, that he has found that several of his patients, re-

ceived into the Devon and Exeter hospital, who laboured under the colic of Devonshire, had never drunk any cyder ; and that the cyder, which others had drunk, was made in pounds, which had no lead in any part of their composition.

However improbable it may appear to those, who know that cyder is the common drink, especially of the lower class of people in Devonshire, that an inhabitant of that county, received into an infirmary, should never have drunk any cyder ; yet I will admit, that this assertion may possibly have been founded in truth. And I an-

swer, that, although it is my opinion, that a solution of lead, incorporated with the common drink of the inhabitants of Devon, is the reason why the colic of Poitou is more endemial there, than in other parts of England ; yet I would not be understood to mean, that the inhabitants of Devon are exempted from the various other means, by which experience has taught us, that the same poison will be communicated. It is well known, that in the several counties of Northampton, Lincoln, Rutland, and Leicesters, very little or no cyder is drunk ; and yet in each of those counties, have I seen pa-

tients affected by the colic of Poitou. It will be hereafter shewn that the poison, which is the specific cause of that colic, may by divers means be admitted into the human body ; and although, when it occurs in an inhabitant of the county, in which it is endemial, it should seem most probable, that it has been conveyed by the means of cyder ; yet it cannot be doubted, but that the various means of conveying that poison may operate there, which prevail in the other counties of England.

“ That the cyder, which
 “ others had drunk, was made
 “ in pounds, which had no

“lead in their composition,” may likewise be admitted to be true ; and yet, if we consider that more than one way has above been pointed out, by which that liquor may reasonably be supposed to be adulterated with lead, this evidence may perhaps appear to have no great force.

“ If,” says a very learned friend, “ the quantity of lead, “ which was obtained by your “ assay, were, in general, dissolved in our cyder, scarce “ any one of our great cyder- “ drinkers, who must daily “ swallow a grain or two of “ dissolved lead, could escape

“ the dry colic ; and, in consequence, this county must have been long since depopulated.”

I have reason to think, that the cause, which I have assigned, is as general, as the effect produced ; but as to the exact quantity of lead, which may, in general, be dissolved in the Devonshire cyders, that I by no means undertake to determine. If, from what has been said, it shall appear to be a probable supposition, that Devonshire cyders, in general do contain even the smallest quantity of lead, the inference, which I have drawn, will not, I think,

be disputed by any one, who knows what is the genuine, the specific operation of that mineral, when taken into the human body. And be it remembered, that, whatever cause of the endemial colic be supposed, it is undoubted, that equal quantities of that cause do not produce equal effects on all constitutions ; and that many great cyder-drinkers have never been attacked by the disease. Be it likewise remembered, that the argument, urged by my friend, against a metallic solution, will be as valid against a poisonous acid ; nor can we account for the reason, why the county has not been depopula-

ted by one general supposed cause, any more than by the other.

The same gentleman insists, that the servants of those farmers, who have a great deal of lead in their pounds and presses, are not more subject to the colic, than those of their fellow-parishioners, who use no lead at all; and that the servants and labourers of those, who make very poor, crude, sour, cyder, are, of all persons, the most afflicted by this disease. The first part of this evidence is directly contradicted by that of several persons of accuracy, who have communi-

cated to me their observations. It may likewise be considered, as, in some manner, contradicted by the authority of Dr. Wall ; who, in a cyder-county, where the dry colic is almost unknown, attended several patients, under that disease, occasioned by cyder, adulterated by means of sheet-lead, nailed over a press ; and who likewise testifies, that all who drank the cyder, which had been kept in a leaden cistern, *were affected by it, as the lead workers usually are.* Dr. Ingen-Housz, who was very lately in Normandy, inquired whether or not any lead is used there in the *apparatus* for making cyder ; and he was inform-

ed, that no lead is employed for that purpose in any part of that province. He likewise was informed, that, in the hospital at Rouen, there are generally many patients, under the colic of Poitou, such as potters, painters, and other workers of lead ; but that there is in Normandy no endemial colic, which can be attributed to cyder. And, as to the latter part of my friend's evidence, if we recollect what has above been said of the several pernicious methods of making, and of managing cyder, which prevail in the county of Devon, the most probable conclusion will be, that if crude, sour cyder be

most productive of the colic, the reason is, not only because the greatest acidity of the solvent will produce the strongest metallic solution ; but likewise because both the farmers and dealers in cyder have unfortunately learned, that, among all the various things, which have been tried, lead is the most certain and effectual corrector of the sourness and austerity of their cyder.*

* I here appeal to the conscience of one person, in particular, whose zeal has induced him to oppose my opinion in print, whether it be not true that he has for many years sold sugar of lead to the farmers for the purpose of correcting sour cyder ?

It having been suspected, that iron might possibly be dissolved in the cyder of Devonshire, many experiments were instituted on solutions of iron in different vegetable acids, in mineral waters, and in cyder. Hence it fully appeared, that all the strong solutions of iron in vinegar and cyder, became, even without any addition, of a deep black colour ; and that, even when they were highly diluted, they shewed more or less of a livid tinge ; very different from the strongest solutions of lead, which, of itself, rather made the liquor of a lighter colour.

It appeared likewise, that on dropping into any of the lighter chalybeate solutions, the smallest quantity of either of the two tests, abovementioned, a deep inky colour was immediately the consequence, with more or less of a dark precipitation; but that the change of colour, and the precipitation, produced by the solution of orpiment, were the most remarkable. This perhaps might be owing to the astringency of the lime-water in that composition.

When the same quantity of the same tests was applied to the strongest solutions of lead, under every similar circum-

stance, the result was entirely different. In these solutions no tinge of an inky colour was produced ; but constantly more or less of a dark brown colour.

It appeared likewise, that, a strong infusion of an astringent vegetable being poured on solutions of iron and of lead in the same cyder, in the smallest equal quantities, the solution of iron was immediately changed to an inky colour : but that the solution of lead shewed no discoloration.

It may therefore be fairly concluded, that the smallest quantity of iron can hardly

exist in cyder, without being discovered both by the solution of orpiment, and an astringent vegetable infusion. It may also be concluded, that cyder, in which such an infusion makes no change of colour, does certainly contain no iron in its composition : that the same cyder, changing to a brownish colour, on the addition of the solution of orpiment, at once shews an impregnation of lead : and that, although the solution of orpiment makes an evident change of colour, and a copious precipitation in solutions both of iron and lead in cyder, even in small quantities, yet the colours of the two liquors are, in

all their gradations, as plainly to be distinguished, as are those of ink, and Madeira wine ; and consequently can never deceive persons, conversant with such experiments.

It may farther be observed, that all the precipitations, produced by the tests, or by an astringent infusion, when applied to solutions of iron, upon standing, became blacker ; but that solutions of lead, thus treated, were seldom changed to a darker colour.

It is likewise remarkable, that an addition of more of the tests (after a certain quantity

had been instilled) to the solutions of lead, did not in any degree heighten the colour of the liquor : whereas all the precipitates, produced by the tests, and by an astringent infusion, applied to solutions of iron, were always heightened in their colour, upon the addition of more of the precipitating liquor.

But (what will put the matter in question out of all doubt) various specimens of Devonshire cyder, which, on the application of the tests, had evidently appeared to have been impregnated with lead, when tried by an astringent infusion, shewed

no signs of a chalybeate impregnation.

In fine, it has been shewn, that a solution of lead is frequently to be discovered in the cyder of Devon. The various means, by which this liquor may be supposed to be thus adulterated, have been pointed out. That this is a cause sufficient to produce the Devonshire colic, cannot be controverted ; and it seems to me most probable, that, as it is adequate to the effect, so it is the sole cause of that disease. Does not such a supposition appear to be agreeable to the general simplicity and uniformity of nature ? In

this opinion however, I may have erred ; but I shall be happy even in my error, if it shall excite some more successful inquirer to investigate, and to discover a truth of so much real importance to human society, and particularly so to the inhabitants of those parts of the world, in which this very formidable disease is endemial.

II. *An Examination of several means, by which the poison of Lead may be supposed frequently to gain admittance into the human body unobserved, and unsuspected.*

Read at the COLLEGE July 13, 1767.

ALMOST every day's experience furnisheth physicians with examples of painters, and plumbers, and the other numerous artificers, employed either in manufacturing the several preparations of lead, or in applying them to their respective uses ; who, after having suffered the most extreme torments from the colic of Poitou, are

restored to health, and remain free from that disease, so long, at least, as they quit their usual business, or pursue it with greater caution. But there is a chronic species of this malady, still more formidable in its effects, which not unfrequently occurs ; and to which, as far as I have observed, persons of thin, tender, irritable habits, are particularly subject. The first beginnings of it are slight, and generally are, therefore, not much regarded. In this state, it is sometimes referred to causes which do not exist ; and opposed by medicines, which perhaps tend only to co-operate with the disease. In

the mean time, it steals on by slow progression ; each successive paroxysm becomes more severe than the former : and the patient is at length reduced to the most deplorable state of infirmity. His muscles waste ; his limbs are contracted ; his respiration is difficult ; and, after having, a long time, dragged on a most miserable existence, he dies, generally either convulsed, or apoplectic. In the first case, I mean that of the workers of lead, it should seem, that a large quantity of the poison is taken into the body, and at once produceth violent effects ; in the latter, that it is gradually, and in small quanti-

ties, accumulated in the constitution ; that it acts slowly and imperceptibly ; and lays a foundation for irreparable mischief, before any alarm is taken. According to the testimony of Boerhaave, “ tanto pejus afficit, “ quo irrepit tectius ; nec se “ manifestat, nisi devictis jam “ corporibus,” (Elem. Chem. vol. ii. proc. 170.) In the first case, it makes its attack in the manner of an open enemy. Those, concerned with it, well know the dangers and difficulties, with which they are to contend ; and can even prepare and guard themselves against its power. In the latter case, it acts as it were by

stratagem ; secretly incorporates itself with our food and liquor ; and has thus an opportunity of undermining the first principles of animal life : becoming the parent of a most cruel disease, which with all our care, circumspection, and experience, it is very difficult for us either to prevent, or to remedy. Zeller has the following observation concerning the effects of wine, impregnated with litharge, on some of those people, who drank only small quantities of it. “ Quibus
 “ potus hic vel quotidianus est,
 “ vel frequentior, non tamen
 “ adeo largus ad inebriationem
 “ usque, illico quidem exinde

“ non læduntur, sensim autem
 “ sensimque varia experiuntur
 “ mala ; quæ, cum ab initio le-
 “ via sint, neque curant neque
 “ animadvertunt ; successive
 “ autem dolorem hypochondrii
 “ sinistri, ventriculi gravita-
 “ tem, inflationem, et tabem
 “ sentiunt.” It was probably

from an observation of such
 slow, but certain effects of lead,
 that the French and Italians
 took the hint of preparing their
 celebrated poisons, called *pou-
 dres de succession* ; the basis of
 which has generally been sup-
 posed to have been that mine-
 ral. Zeller mentions a certain
 chemical operator, near the
 confines of Bohemia, who, af-

ter having diligently applied himself to the composition of poisons, did, by the means of lead, combined with some more volatile and corrosive substance, prepare a most slow poison ; which, given to dogs, and other animals, had the power of destroying them, without producing any violent symptoms, and after several weeks or even months. “ Confirmavit
 “ hoc excellentissimus D. Præ-
 “ ses, mihi que retulit se qua-
 “ tuor istiusmodi venenorum
 “ lentorum descriptiones vidis-
 “ se, quarum quamlibet satur-
 “ nus ingrediatur, paucis addi
 “ tis aliis acidis acribus, in exi-
 “ gua tamen dosi, ita ut in

“ quovis saturnus basin con-
“ stituat.”

Notwithstanding the severe laws, which are still in force, both in France and in Germany, against the adulteration of wines, by the means of litharge, we still frequently find that the small French white wines, and the Rhenish and Moselle wines, bear marks of this most pernicious fraud. And, in confirmation of this fact, Dr. Warren informs me, that in the year 1752, thirty persons, belonging to a family* at that

* The family of the late Duke of Newcastle.

time in Hanover, were seized with the colic of Poitou, in consequence of having drunk a sweet French white wine, in which some preparation of lead had been dissolved.

That such an adulteration is ever wilfully practised on vinegar, there is no reason to suspect ; for it would tend to destroy the most essential quality of that liquor. However, I have met with several specimens of vinegar, which have evidently appeared to be impregnated with lead. Whether it might have been thus adulterated by means of glazed earthen vessels, in which it

might possibly have been kept, or by what other means, I must leave undetermined. It is certain, that a liquor, so commonly used with our food, cannot be too cautiously guarded from a poison, which it so easily dissolves.

In Holland, and perhaps in other countries, it has been customary to correct the more offensive expressed oils, so as to substitute them to oil of olives, or oil of almonds, by means of this metal. And we are informed by M. de Haen, that some years ago, when the mortality among the cattle had made butter extremely dear,

some farmers, in the low-countries, had a practice of adding to the weight of it by a quantity of cerusse. What would be the effects of such oil and such butter, taken into the stomach, it is very obvious to conceive.

The custom, which prevails in many parts of this country, of keeping milk in leaden vessels, seems liable to a similar objection. One would naturally imagine, that it cannot turn sour in such vessels, without dissolving some of the metal. But on applying the *liquor probatorius*, to some milk which I had kept in a leaden

vessel six days, I perceived no such discoloration of it, as shewed any saturnine solution.

It should seem likewise, that leaden vessels, or wooden vessels lined with lead, which are used in many families, for the purpose of keeping salted meats, ought not here to pass unnoticed. But Dr. Darwin, of Lichfield, informs me, that he applied the *hepar sulphuris* to some brine, taken from a leaden cistern, in which salted beef had been long kept; but that he observed no extraordinary discoloration. Here he suspected, that the lead might possibly have been pre-

cipitated by some putrescent parts of the flesh. He therefore steeped some bits of lead in salt and water, many days. But, on examining this water by means of the test, he saw no signs of a solution of lead. Upon a repetition of Dr. Darwin's experiments, I have found the result of them to be in no way different from what he mentions. I cannot, however, dismiss this subject, without observing, that in glazed earthen vessels, in which salted meats have been kept, I have sometimes seen evident marks of a corrosion.

But it cannot be doubted,

that culinary vessels, lined with a mixture of tin and lead, may communicate pernicious qualities to acid foods. This custom of lining copper vessels with tin, with a view to prevent any disagreeable taste, or bad effects from verdigrise, we find to have been very ancient. Pliny, in his natural history (lib. xxxiv. cap. 17.) expressly mentions, on what principle this method was practised. “*Stannum, illitum æneis vasis,*
“*saporem gratiorem facit, et*
“*compescit æruginis virus.*” It appears likewise, that tin and lead were frequently compounded for the purpose of lining copper vessels, in the time of

Pliny. Galen, in his first book *de antidotis*, complains of this as a dangerous mixture ; and, on that account, we find him giving very particular directions, in what vessels his *pastilli theriaci* were to be kept. The intire passage to which I allude, is as follows. Ἡ δὲ ἀπόθεσις ἐν ἀγλαίῳ κασσιτερίνῳ, ἢ ὑαλίνῳ, ἢ χρυσοῷ γινέσθω. Τὸ μὲν οὖν ὑαλίνον καὶ τὸ χρυσοῦν οὐδεμίαν ἔχει τὴν δόλωσιν· τὸ δὲ κασσιτερίνον μίξει μολύβδου δολοῦται. Τὸ τοιοῦτον οὖν φεύγειν προσήκει, οὐ μόνον ἐπὶ ταύτης, ἀλλὰ καὶ τῶν ἄλλων ἀντιδότων ἀπάσων. However unnecessary this caution of Galen may appear to have been, with respect to the keeping the *pastilli theriaci*, supposed already dry, in a vessel

compounded of tin and lead ; it will hardly be doubted, but that great mischief may be apprehended from the use of such a metallic mixture, when applied to many culinary purposes ; if it be considered how readily lead is dissolved in all the vegetable acids, as well as in oily and fat substances.

Upon inquiry into the composition, which is ordinarily used for lining copper vessels, I find it to consist of block-tin and lead, in different proportions, laid on with a solution of crude *sal ammoniacus*, or resin. It seems probable, that this composition is made with more

or less lead in an arbitrary manner, as the artist chooseth. There is one person in this town, who professeth to line his copper utensils with block-tin, without any other metallic addition. Others, of the same trade, insist that this cannot be done. Some even justify the mixture of lead ; and contend that, by the means of it, the metal acquires a brighter colour, more like silver. Upon examination, I find, that it is much more difficult, as well as more expensive, to line vessels with pure tin only ; that the metallic composition, being more malleable, is more easily spread

over the copper ; and that to lay on pure tin requires a peculiar dexterity, which few or none of the common artists are masters of. And I am informed, that, even when the common artists do honestly intend to line their vessels in the best manner, although they do spread a coat of pure tin on the surface of the copper, clean scoured, and washed with a solution of the crude *sal ammoniacus* ; yet they do not possess the art of finishing their work perfectly, unless by covering the surface with a composition, in which there is a very large proportion of lead, namely, the proportion of ten ounces of

lead to sixteen of tin ; which increased quantity of lead brings the composition very near to the common standard for tinning copper vessels.

I have in my possession several specimens of the metallic mixture, used for this purpose, which I collected from different shops. That lead made a part of this composition, was manifest from its softness, easy fusibility, and easy calcinability. But in order to prove this with greater certainty, I filled the same bullet-mould exactly with the melted metals mentioned below. Their weight in air was as follows.

- No. 1. Pure block-tin, 190 grains.
- No. 2. A composition made of sixteen parts of tin, and ten of lead, 217 grains. Increase 17 grains.
- No. 3. Tinning metal, of one shop, 212 grains. Increase 22 grains.
- No. 4. Tinning metal, of another shop, 218 grains. Increase 28 grains.
- No. 5. Pure lead, 286 grains. Increase 96 grains.

But I am informed by a person, conversant in this business, that, in order to determine, whether or not the metal, used for the purpose of cover-

ing copper vessels, contains a mixture of lead, no other experiment is necessary, than to rub the surface of it with a finger ; which, when lead enters the composition, always contracts a livid, blackish colour ; but is not discoloured, when rubbed on pure tin only.

In order to determine, whether sauces are ever really impregnated with lead in the common culinary vessels, I ordered a mixture to be made of butter, water, and salt ; and one eighth part of distilled vinegar to be added. This composition, after it had remained twenty hours in the tinned vessel, in

which it was made, and heated, was again exposed to the fire ; and a small portion of it being examined by the volatile tincture of sulphur, became immediately of a dark brown colour. A small quantity of the *hepar sulphuris* (prepared in the manner already described) having been dropped on another portion of the same sauce, occasioned a discoloration still darker.

Another sauce, exactly of the same composition, was prepared in the same vessel ; and was immediately examined in the manner before mentioned. The result of these trials was

nearly similar to that of the former. Only the discoloration was less dark.

Another sauce was made in the same vessel, exactly of the same materials, and in the same quantities ; to which the proportion of distilled vinegar, above-mentioned, was added, after it was poured into a glass vessel. Upon this mixture the same trials were made with both the tests. But no such change of colour was observed. The *hepar sulphuris* only made it whiter, than it had been before that addition.

The gradation of colours in the three sauces, on which the

trials had been made, was so evident, that a person, who had not been present, when they were made, had no difficulty in determining, which sauce contained the greatest quantity of lead ; which had the least ; and which had none.

The same sauce, having been prepared in a silver vessel, was kept in it twenty-four hours. But, on the application of the tests, its colour was not affected.

The same trials were afterwards made on some clear soup, made at a tavern, in the prepa-

ration of which several acid vegetables had been used. Both the volatile tincture of sulphur, and the *hepar sulphuris* produced in it a dark colour.

In Neuuman's chemical works, translated by Dr. Lewis, page 460, there is a note subjoined by the editor, respecting the habitude of tin to the acetic acid; Neuuman having found that this metal does not dissolve in vinegar, and Margraaf having affirmed that it dissolves in it with ease. From some experiments, which Dr. Lewis made on plates of tin, put into common vinegar, and into the acid juices of fruits, he

concludes, that, although tin may not be soluble in these acids, with regard to the purposes, for which the chemists want such a solution ; yet that tin, or tinned vessels, however pure the tin be, will give a metalline impregnation to light vegetable acids, suffered to stand in them for a few hours.

I do not undertake to decide a question, concerning which men of such chemical experience have differed in their testimony. But it seemed necessary to determine, whether or not any solutions of tin, in the vegetable acids, could deceive us in our trials with the tests.

Therefore the following experiments were made.

I. Into some vinegar, in which a thin piece of block-tin had been left twenty-four hours, were instilled several drops of the solution of orpiment. Only a deep yellow colour was produced.

II. Into an equal quantity of the same vinegar, the same quantity of the solution of orpiment was instilled. The colour of the mixture was exactly the same, as in the former experiment.

Hence it appeared, that the

vinegar had received no addition from the tin, which was demonstrable by that test.

III. To the vinegar, of the first experiment, after it had stood near three weeks on the tin, the same quantity of the solution of orpiment was added. The appearance of the mixture was exactly the same, as in the first experiment.

IV. A few drops of the volatile tincture of sulphur were added to the vinegar, of the first, and of the third experiment. No change of colour was produced, which was not

equally produced by the same addition to pure vinegar.

V. In order farther to determine, whether any solution of tin in the vegetable acids could possibly deceive us in our trials with the tests ; I put into a sand heat, common vinegar, essential salt of sorrel, juice of lemons, with a thin plate of tin in each. These, after maceration for twenty-four hours in B. A. were examined by means of both tests. But neither of them shewed any discoloration, except what the same tests had before produced in pure vinegar.

It is, therefore, fairly to be concluded, that pure tin yields nothing to vegetable acids, which can make our experiments on common tinned vessels, by means of the tests, fallacious.

From what has been premised, does it not seem reasonable to imagine, that the health at least of persons of tender constitutions, may sometimes receive injuries from the use of acid sauces and soups prepared in such vessels? Particularly, is it not probable, that the bowels of children may frequently suffer from their food, in this manner impregnated with lead?

And, in general, may it not justly be concluded, that some of the slighter disorders of the first passages (which one practitioner may perhaps attribute to indigestion, another may call, by a fashionable term, *bilious*, *nervous*, *scorbutic*, or by other terms, too often expressive of nothing, but our own ignorance) may be the first effects of a concealed poison? And may not some part of that benefit, which our health usually receives, on our quitting, for some time, the accustomed place of our residence, arise from the circumstance of our quitting the daily use of something deleterious, which we

may have been accustomed to swallow with our daily nourishment ?

Nor is there less danger to be apprehended from the use of the common glazed earthen vessels. It is well known, that the *calces* of lead are more easily dissolved in the vegetable acids, than the crude metal. Vinegar, boiled with the glass of lead, or in the glazed earthen vessels, the glazing of which is principally lead, becomes strongly impregnated with the pernicious qualities of the metal ; and yields, on evaporation, a true *saccharum saturni*. But this glazing is very considera-

bly acted upon even by cold vinegar. And hence it is manifest, that the custom, which I apprehend to be too common, of keeping pickles in such vessels, cannot but be dangerous to health. And the same observation may, on the same principle, be made on a practice, which, I find, prevails, particularly among the lower class of people, of baking their fruit-tarts in a cheap kind of glazed earthen ware. A friend of mine lately informed me, that, having observed a currant-tart, in such a dish, he expostulated with the mistress of the family on the danger, which might be apprehended from this

custom ; and that she answered,
 that “ she gave the preference
 “ to that sort of earthen ware
 “ upon a principle of frugality ;
 “ it being a fact commonly
 “ known by all good house-
 “ wives, that fruit, baked in
 “ those vessels, requires a much
 “ less proportion of sugar to
 “ sweeten it, than when baked
 “ in any other vessel what-
 “ ever.”

Here then is a remarkable
 instance of a most insidious poi-
 son, taking as it were an advan-
 tage of our necessities, and re-
 commending itself to us by
 means of a quality, which at
 once favours œconomy, gratifies

the palate, and may lay the foundation of a painful, lingering disease, more formidable than death.

When the distillation of simple waters was first introduced, we find that leaden alembics were used, on the following principle ; because lead, on account of its frigidity, was supposed to have a power of very easily converting the vapour, arising from plants, into water. Matthiolus, who contends, that more water may be distilled by a leaden alembic than by one made of any other metal or matter, mentions, that some inconveniences had been experi-

enced from lead applied to this use ; namely, that the water, thus extracted, was apt to taste of smoke, and not to retain the peculiar flavour of the plant or flower ; that it was apt to acquire a sweet taste from the lead ; and was not only disagreeable to the sick, but that it sometimes brought great mischief on the breast, the stomach, the liver, and the other *viscera*, having contracted a deleterious quality from the metallic vessel.—“ Fit quidem, ut “ superficies ipsa” (*scilicet plumbei alembici*) “ in cerussam tenuissimam vertatur ; quæ deinde, aquis sese immiscens, illis dulcedinem addit. At-

“ que id videre est in albo tali-
 “ um aquarum sedimento ; præ-
 “ sertim ubi aquæ per plum-
 “ beum alembicum recens para-
 “ tum meaverint. Nam vas,
 “ quod diu in hoc opere usur-
 “ patum est, obducta circum-
 “ quaque quadam veluti gypsea
 “ crusta, non ita facile a vapo-
 “ ribus deraditur et in cerus
 “ sam vertitur.” *Pet. And. Mat-
 thiolus de ratione distillandi aquas
 ex omnibus plantis.*

Although leaden alembics
 are now entirely out of use, it
 would appear, that this observa-
 tion of Matthiolus was well
 founded. That an acid arises
 during the latter part of the

distillation of simple waters, is very certain. This is manifest from its frequently coming over impregnated with copper, when the alembic is not properly tinned. And Boerhaave, in his *elementa chimiæ*, vol. ii. *proc.* 171, has proved, that lead is convertible into cerusse, even by the very mild acid, which first arises in the distillation of vinegar, and which indeed scarce manifests to the taste any marks of acidity.

It seems not improbable, that, if we had an opportunity of making an accurate inquiry, we might see reason to conclude, that the disease, called popularly

the dry-belly ach, which is common as well in the northern colonies of America, as in the islands of the West-Indies, ought to be referred wholly to lead, as its cause. Those physicians who have mentioned this disease in their writings, have, in general, considered its cause in a vague, undeterminate, unphilosophic manner. They generally bring together several causes, very different from each other ; which are not proved to be adequate to the effect produced. The following is the language, which we generally meet with in books. “ New
 “ rum, and a great quantity of
 “ fresh and unripe lemon and

“ lime juice, made into punch,
 “ seem to be commonly the
 “ causes of this disorder in the
 “ West-Indies ; as distillers of
 “ rum, boilers of sugar, and
 “ over-seers, are chiefly sub-
 “ ject to it : the first, who are
 “ generally of the poorer sort,
 “ from immoderately drinking
 “ new, hot rum ; the second
 “ and third from taking cold,
 “ after sweating in hot boiling
 “ houses, and drinking very
 “ strong punch, made with
 “ fresh limes, and newly dis-
 “ tilled rum.” I am informed
 by an intelligent person, who
 resided some time in the island
 of Jamaica, that very few, if
 any inhabitants of the West-

Indies, who are nice in the choice of rum, that is, who drink it of a proper age, are afflicted by the dry-belly-ach ; and, that the persons, particularly subject to this malady, are under-servants, and those slaves, who attend the boiling, and the distilling houses. But this gentleman likewise supposeth, that there are other causes, which concur in producing this effect, particularly the crude, unripe lemons and limes, with which these people make their punch. He likewise observes, that the people, who are the most tormented by the dry-colic, are such as are obliged to work, or attend, day and night,

in the boiling houses, during the crop-season, surrounded by a constant atmosphere of smoke from the boiling sugar, and subject to perpetual streams of cold air, from the doors and windows, which are always open.

In the island of Jamaica, as I am informed, the sugar coppers are rimmed with lead ; and the spouts are lined with the same metal. The still is copper tinned ; the still-head tin or pewter ; as is the worm of the refrigerator.

My information from the island of Antigua is, as follows.

“ The sugars are boiled in cop-
“ per vessels ; the skimmers
“ and ladles are made of cop-
“ per ; the wall, in which the
“ coppers are hung, is covered
“ with lead. The molasses is
“ received in a wooden cistern,
“ and carried to the still-house
“ in wooden pails ; fermented
“ in wooden vessels ; distilled
“ in copper stills, with pewter,
“ or copper heads tinned ; and
“ pewter worms. The worms
“ and stills are commonly sent
“ from London, and from Bris-
“ tol, to the island of Antigua.”

What is, in general, the
composition of the metallic
mixture, used for the purpose

of lining copper-vessels, has already been fully explained. As I am instructed, all the pewter, that is prepared in this country, the very best kind of it only excepted, contains a quantity of lead. That, made in Holland, contains a very large proportion of this metal. The very best pewter is said to be a compound of tin, and the martial regulus of antimony; in the proportion of one hundred pounds of the former to seventeen pounds of the latter. The worms and stills, which are sent from hence to the West-Indies, are said to be made always of the inferior

sorts of the composition, called pewter.

My suspicions, concerning this subject, have been greatly confirmed by the authority of Dr. Franklyn of Philadelphia. That gentleman informs me, that, at Boston, about forty years ago, leaden worms were used for the distillation of rum. In consequence thereof, such violent disorders were complained of by the drinkers of new rum, that the government found it expedient to enact a law, forbidding the use of any worms, except such only as were made of pure block-tin. This law

having been enacted, the dry-colic was much less frequently heard of than before. But the law was complied with only in part ; for, from that time to the present, instead of block-tin, they have used a pewter, containing a large proportion of lead. Dr. Franklyn likewise informed me, that the colic of Poitou is not so frequent a disease in any of the colonies, as it was formerly ; and that the reason, commonly assigned, is that the people now drink their punch very weak in comparison with what they were formerly accustomed to ; which used to be rum and water in equal quantities. He added;

that they now also drink their punch, with more juice of fresh limes in it; and, as that juice, joined to certain laxative medicines, is at present their common remedy, when any are seized with the disease, so it is generally considered as the best preservative against it.

I am likewise informed by a gentleman, who resided many years in the Bahama-islands, that the dry belly-ach has hardly been known in those islands, since the inhabitants have left off the distillation of rum. The same gentleman informs me, that the people of the Bahama-islands drink very large quanti-

ties of small punch, made extremely acid by the juice of limes ; many of the labouring people to the amount at least of two gallons every day.

It is hoped, that what has here been thrown out concerning the most probable cause of the colic, which is endemial both in the West-Indies, and on the continent of America, may appear to those, who have opportunities of making a more accurate inquiry, to be not unworthy of their attention.

One instance of the great caution of Galen, with respect to the use of lead, has already

been mentioned. In another part of his works, after having recommended pure rain water, as the most proper for the preparation of a medicine, of which the heads of poppies were the *basis*, he particularly directs, that water, flowing through leaden pipes, is to be avoided.

Τὸ ὕδωρ, διὰ τῶν μολυβδίνων σωλήνων ὀχετευόμενον, φευκτέον. ἰλύματα γάρ τινα τοῦ μολύβδου κατὰ τοῦτο περιέχεται. Διὸ καὶ οἱ πίνοντες ὑποστάθμην τοῦ τοιούτου ὕδατος δυσεντερικοὶ γίνονται.

But, long before the time of Galen, Vitruvius (*de architectura*, lib. viii. c. vii.) had published a very strong remonstrance against leaden pipes, when used for the purpose of

conveying water. “ Multo sa-
 “ lubrior ex tubulis aqua, quam
 “ per fistulas : quod per plum-
 “ bum videtur esse ideo vitiosa,
 “ quod ex eo cerussa nascitur :
 “ hæc autem dicitur esse nocens
 “ corporibus humanis. Ita si
 “ quod ex eo procreatur, id est
 “ vitiosum, non est dubium,
 “ quin ipsum quoque non sit
 “ salubre. Exemplar autem ab
 “ artificibus plumbariis possu-
 “ mus accipere, quod pallori-
 “ bus occupatos habent corpo-
 “ ris colores. Namque cum
 “ fundendo plumbum flatur,
 “ vapor ex eo insidens corporis
 “ artus, et indies exurens, eri-
 “ pit ex membris eorum sangui-
 “ nis virtutes. Itaque minime

“ fistulis plumbeis aqua duci
 “ videtur, si volumus eam ha-
 “ bere salubrem.”* The com-
 mentators have differed in their
 opinions, with respect to this
 passage. The Marchese Gagli-
 ani defends Vitruvius. “ Pare,
 “ che l’acqua sola non sia ca-
 “ pace di estrarre dal piombo
 “ la cerussa ; ma non poten-
 “ dosi negare che è quasi im-
 “ possibile trovare acqua che

* Palladius (August. tit. xi.) maintains
 the same opinion. After having conside-
 red the several other methods of con-
 veying water, he adds, “ ultima ratio est
 “ plumbeis fistulis ducere, quæ aquas nox-
 “ ias reddunt. Num cerussa plumbo at-
 “ trito creatur, quæ corporibus nocet hu-
 “ manis.”

“ non contenga alcuna, an-
 “ corchè insensibili, parti-
 “ celle, o acide, o saline, con-
 “ viene uniformarsi, ne’ casi
 “ che si può, al sentimento di
 “ Vitruvio.” On the other
 hand the French commentator,
 M. Perrault, opposeth to the
 opinion of Vitruvius. “ Qu’il
 “ n’y a aucune apparence, que
 “ l’eau puisse changer le plomb
 “ en cerusse, puisque même
 “ elle n’altère, en aucune façon,
 “ le cuivre, qui est bien plus
 “ aisé à rouiller. Car on ne
 “ voit point, que les robinets
 “ des fontaines soient rongés
 “ par l’eau, après avoir servi
 “ cent ans.”

It therefore appearing to me of importance to determine, which of these two contrary opinions is founded in truth, I kept some water of the river Thames, some water of the New River, and some spring water in three leaden pipes, and agitated the contents of each pipe, almost every day, during two months. I then very carefully examined the three several waters by the means of the tests above mentioned. But there appeared not in either of them any discoloration, which could be supposed to manifest a solution of lead. I afterwards tried the same experiments on some water of the New River, which had been

kept a fortnight in an old rusty leaden pipe, long used for the purpose of conveying water. But I could not even here find any sufficient reason to suspect a saturnine solution. Some water likewise, collected from the hollow parts of the leaden covering of a church, shewed no marks of lead when examined in the same manner. The caution therefore of Vitruvius and of Galen, as likewise that of Aëtius (who condemns the use of rain water, which has flowed down from a roof, covered with lead) could not but appear to me unnecessary, except in a case where a quantity of vegetable acid might be sup-

posed to render the metal dissoluble in water ; by which means, as we are informed by M. Tronchin, an epidemic colic, similar to that of Poitou, was occasioned in the city of Amsterdam. But Dr. Heberden has lately shewn me some water, which has been twelve years kept on bits of lead. The phial, in which this water had been preserved, had not only a copious white precipitation at the bottom of it, but its sides also were almost covered with a crust of the same colour.

On a little of this water (which was quite pellucid) I dropped a small quantity of the

solution of orpiment. It immediately became of a very dark colour ; and, after having stood a few hours, deposited a deep black sediment.

The same water, having the same quantity of the volatile tincture of sulphur dropped into it, became of a clear reddish brown, not unlike that of the common Madeira wine.

I filtered a little of the same water, and then dropped into it the same quantity, as before, of the solution of orpiment. But it produced no sensible change of colour ; nor did an increased quantity of the solution make

any other change in it, than what would have been made in any other pure filtered water.

Exactly the same *phænomena* were observed, upon the addition of the volatile tincture of sulphur to a little of this filtered water. No other change of colour was produced, than what any other liquor of the same colour, mixed with pure water, would have occasioned.

Hence it appears, that lead is not capable of solution in water, even in twelve years, but only of mixture and suspension. But it likewise appears proba-

ble, that so much lead may be thus mechanically mixed with, and suspended in water, as to communicate to it noxious qualities. So that we see the reason, why the ὑποστάθμη τοῦ τοιούτου ὕδατος, *the sediment of such water*, may, according to the observation of Galen, render those, who swallow it, δυσεντερικὸς *subject to disorders in the intestines*

Hieronymus Mercurialis is of opinion, that the ancient Romans in general, were very apprehensive of the dangers, arising from the common use of lead. His observations, on the remains of the aqueducts of Rome, induced him to think,

that the old inhabitants of that city avoided, as much as possible, leaden pipes, particularly for conveying that water, which was not only to serve for the purposes of cleanliness, but likewise for the preparation of their food. Indeed he can scarcely imagine, that the water, which was brought from the mountains of Tybur, (the modern Tivoli, sixteen miles from Rome) was much, if at all used in the preparation of their meat and drink, since Galen, who was a curious observer of every thing relating to that city, asserts that all the water, conveyed to Rome from Tybur, was crude, and unfit for boiling

food ; adding, that Rome was furnished with many very excellent springs, useful to the sick as well as to those in health.

Not long ago, M. Thierry, regent of the faculty of physic at Paris, published his short notes and observations, concerning the colic of Madrid and its neighbourhood. We are here informed, that this colic, which is described as assuming the characteristics of that, which raged in the province of Poitou, towards the end of the sixteenth, and in the beginning of the seventeenth century, is very frequent at Madrid, and

in great part of New Castile in Spain. In his general view of the causes, which conspire to render this disease so frequent in those parts, he entirely excludes a cause, to which it has generally been ascribed, namely, sour wines ; insisting that the wines of la Mancha, which are principally drunk in Castile, never become sour ; and moreover that the honesty of the people would not suffer any such criminal frauds to be practised, as might endanger the lives of the inhabitants of whole cities. He likewise contends, that the food is, in general, wholesome in its nature, and that it is used with great

moderation. But, according to this author, the unequal temperature of the air, and the elevated situation of Castile, are the principle causes of that disease ; which M. Thierry informs us, is, on that account, less frequent at Toledo, than at Madrid and Alcala ; and is hardly known on the borders of Navarre. And, if we could run over the whole globe, he thinks it probable, that we should find this disorder more frequent under the tropics, than in regions nearer to the poles ; and always more frequent in the middle of every country, or near the coasts bordering upon the ocean, than near to

rivers, or the Mediterranean sea.

Not to enter into a discussion of this author's theory, which is evidently liable to various objections, I shall content myself with observing that, to examine very particularly, whether or not that poison, which is known to be sufficient to the effect produced, is not by some general unsuspected means taken into the stomach, would be a very interesting inquiry to the inhabitants of Madrid, and its neighbourhood. For, notwithstanding what M. Thierry has asserted, may not there be, either by means of fraud, or of

accident, in the wines, drunk
 at Madrid, a saturnine adultera-
 tion? We learn from Hoff-
 mann, “ *vina, quæ circa Ma-*
 “ *drid proveniunt, austerius-*
 “ *cula esse, minus dulcia, et*
 “ *citius etiam acescere in calidis*
 “ *locis.*” And Neuumann in-
 forms us, that most of the Spa-
 nish wines are composed of
 fermented or half-fermented
 wine, mixed with inspissated
 Must, and variously manufac-
 tured ; or of an infusion of
 dry grapes in weak Must. If,
 according to the testimony of
 Hoffmann, the wines, about
 Madrid, are austere, and apt
 soon to turn sour, they cannot
 by any means be more effec-

tually corrected, than by a poison, which, almost in every country, has been applied to that use. And if we are rightly informed by Neuumann, that the Spaniards inspissate their Must by decoction ; from what has been observed in a former dissertation, it will be obvious to conjecture, by means of what accident the wines thus manufactured, may have power to occasion an endemial colic. May it not reasonably be imagined, that some part of this endemic evil may be owing to glazed earthen vessels, which are generally used at Madrid, for almost all culinary purposes ? A physi-

cian, who has long resided in Portugal, is of opinion, that the frequency of the same disease, at Lisbon, is principally to be ascribed to that cause. But it is probable, that, at Madrid, where it is much more frequent, various other means may prevail, whereby the same poison may be taken in by the inhabitants, together with their nourishment. This subject deserves the strictest examination.

In order to confirm the general doctrine, which has been advanced in these papers, concerning the pernicious effects of lead, taken internally, I here subjoin instances of much mis-

chief done by very small quantities of that mineral. The three first were communicated to me by Dr. Heberden. The last I owe to the favour of a learned physician, of undoubted credit.

How very small a quantity of lead will sometimes bring on the peculiar mischief, which it occasions in the human body, appeared in the case of one, who after frequently making bloody water for five years without pain, or inconvenience from going in his carriage over the stones, for the next two years made no other ; at the end of which he died. Upon

opening the body, the substance of the left kidney appeared to be changed into little bags full of *sanies* and blood ; but no stones were found in the urinary passages ; nor had any ever been voided. While the blood was coming away in such an extraordinary quantity, the patient was advised to put himself under the care of one who gave him a grain of sugar of lead, morning and evening, for four days, and then once in two days for three or four days more. The discharge of blood was not at all checked by the sugar of lead : but this small quantity was sufficient to bring on loss of appetite ; intolerable

uneasiness of the stomach and bowels ; want of sleep ; costiveness ; and a paralytic weakness of the hands, which continued upon him for three weeks. The same quantity given to a patient, in a little different manner, four grains being taken in a day for three days, occasioned intolerable uneasiness in the bowels for some months.

A woman, who had a *fluor albus*, took, by the advice of a nurse, one drachm of sugar of lead in the space of nine days. In consequence of this, she was afflicted with great pains all over her body, for above half a year, but not particularly in her

stomach and bowels, except after eating ; and the *fluor albus* was not at all restrained.

Dr. Heberden observes, that all people are not equally affected with equal doses of this poison ; and that this property belongs to it in common with all the nervous poisons ; every one of which, as is daily experienced in *opium*, affects different people very differently.

He observes likewise, that it is greatly to be wished, that lead could be given with more safety ; as it possesses powers, which are often much wanted, and which are not to be found

in any other simple. One of the persons, mentioned above, by taking four grains of sugar of lead, had a flooding stopped, which had lasted for two months, unchecked by all the most powerful astringents in common use. But, he adds, the good effects are not so certain as the mischief ; and, in most cases, would be far overbalanced by it.

A gentlewoman, aged about thirty-three years, had been, for two years, subject to almost a constant *hæmorrhagia uterina* ; for there had been, during that time, very few days, in which she had been quite free from it.

For several days together, she frequently lost half a pound of blood in a day. Some time before this disease began, she had suffered a difficult and dangerous labour ; but having had no extraordinary hæmorrhage at that time, or for some months after it, she could not attribute her disorder to that cause. She had tried several medicines without effect. She had particularly taken the peruvian bark, both in the extract, and in the decoction ; which did not stop the flux. A large spoonful of Eaton's styptic taken twice a day, stopped it for several days ; but it heated her so much, that she could not

continue the use of that medicine. A physician was consulted on the seventh of February, 1761. He found, that, for several days past, she had daily lost at least eight or nine ounces of blood. She was now pale, weak, and emaciated. She had observed no difference with respect to her disorder, from the effect of any food ; and had equally suffered, whether she confined herself at home, or went out to take the air in a coach. He ordered the *emplastrum roborans* to be applied to her loins ; and the following draught to be taken twice a day.

- R. *Corticis peruviani, in pulverem contriti,*
unciam unam ;
Aquæ puræ, uncias sedecim :
Decoque ad uncias duodecim, et cola.
- R. *Hujus decocti, sescunciam ;*
Tincturæ corticis peruviani simplicis
drachmas duas ;
Tincturæ saturninæ, guttas viginti ;
Syrupi balsamici, drachmam unam
misce.

On the tenth of February, the dose of the *tinctura saturnina* was increased to thirty drops ; and the draught, with that addition, was taken twice a day. On the twelfth, finding that though the medicine had agreed well with her stomach, yet the flooding was not considerably abated, he prescribed, instead of the draught, one

large spoonful of the following mixture, to be taken every morning and evening.

R. *Aquæ puræ, uncias tres ;*
Sacchari saturni, grana decem ;
Spiritus vitrioli tenuis, gutta duodecim.
misce.

After she had taken four doses of this mixture, the flooding was much abated ; but she complained of pains in the bowels, and of a sensation, as if they had all been drawn to her back ; and likewise of pains about her stomach, and a straitness in breathing. Judging these to be symptoms of the colic of Poitou, occasioned by the

saccharum saturni, he ordered the following draught, to be taken immediately.

R. *Aquæ alexeteriæ simplicis, sescunciam ;*
Tincturæ senæ,
Electarii lenitivi, singulorum drachmas
duas. misce.

This medicine opened her two or three times. The physician then ordered an oily mixture ; which she could not keep on her stomach. On the next day he repeated the laxative draught, which still kept her body open. On the next day, though the gripes had ceased, she complained of a sickness of her stomach : and vomited all her food, as well as an

oily medicine which she had taken. At night the physician ordered the following pills, to be taken immediately.

R. *Extracti cathartici, scrupulum unum;*
Extracti thebäici, granum unum.
Dividatur massa in pilulas quinque.

She passed the night tolerably easy, though without sleep. She had no return of vomiting for seven hours ; and the next day had two stools. But then she began to vomit all that she had eaten, or drunk. The physician then applied a plaster of *theriaca andromachi*, with some *oleum nucis moschatæ expressum*, to the region of the stomach ; but without effect.

At night he repeated the pills, of *extractum catharticum*, and—*thebäicum* ; which had the same effect as before ; that is, they made her pass the night without vomiting, and gave her a motion or two on the next day. In the afternoon, when she was threatened with a return of vomiting, he gave her one scruple of salt of wormwood, together with a large spoonful of juice of lemons, in the act of effervescence. This she threw up ; but afterwards vomited no more.

The physician observes, that this was a degree of the true painter's colic ; and that it ap-

pears, by this instance, that sugar of lead is, in such a case, a dangerous medicine, at least in the dose in which it was here given : but that it must however be remarked, that, during the time of the disorder in the stomach and bowels, the flooding was either inconsiderable, or totally stopped. The *extractum catharticum cum opio*, he thinks, was manifestly of service, by stopping the vomiting, and giving stools.

He understood afterwards, that, in about a fortnight after he had left the patient, upon a return of the flooding, the apothecary had unadvisedly repea-

ted the solution of the sugar of lead : which produced precisely the same bad effects as before. However, she again got the better of her remedy, and continued for some time with her flooding as before.

Some months afterwards the physician saw this patient. She then looked like a person in good health ; and said she was so. Her account was, that, after he had left her, she returned to the use of the peruvian bark, although she had taken it ineffectually before. But partly to that, and chiefly to the use of florence-wine at her meals, she herself ascribed her recovery.

From what has been offered on this subject, it may fairly be inferred that lead, taken into the stomach is a poison, I do not say, *ex proprietate naturæ et tota substantia*, but which is capable of doing more hurt than good to the generality of men, in all the known ways of using it; and consequently that it cannot be avoided with too much caution.

But is this metal, even when confined to external uses, entirely innocent, and free from suspicion? * I have some rea-

* Dr. Petit informs me that M. Goulard's poultice, applied for some time to a

son to doubt, whether litharge, the common *basis* of our plasters, when used for the purpose of dressing issues, has not, in certain irritable constitutions, produced some of the ordinary effects of saturnine preparations, taken internally. There have been instances of children, thrown into convulsions, by cerusse, sprinkled on excoriated parts. Zeller quotes, on the authority of Moglingius, a remarkable instance of the pernicious effects of litharge, out-

patient's knee, in St. George's hospital, occasioned violent pain in the bowels, which did not cease, until the poultice had been removed.

wardly applied. “ De lithargy-
 “ rio quoque mihi narravit,
 “ matronam quandam nobilem
 “ pulverem ejus, in rubore fa-
 “ ciei, postquam hic ipsi tan-
 “ quam singulare et certissi-
 “ mum arcanum deprædicatus
 “ fuisset, in petia ligatum, ax-
 “ illis bis vel ter die aspersisse
 “ cum præsentaneo effectu ;
 “ verum exinde subsecuta fuis-
 “ se dyspnœam, lipothymiam,
 “ dolores vagos in abdomine,
 “ vomiturationem, et nauseam.”

I have lately met with a most violent and obstinate colic, which seemed to have been occasioned by some litharge, mixed in cataplasm, and applied to the *vagina* with a view to allay

a troublesome itching. And M. Doazam, in the *Journal de Medicine*, for the month of October, 1760, page 302, relates, on the authority of M. Verdelhan, a remarkable case “ de la
 “ femme d’un plombier lami-
 “ neur, qui avoit éprouvé une
 “ vive douleur de matrice, en
 “ forme de colique, pour avoir
 “ mis dans sa chauffrette des
 “ petits charbons mêlés de sco-
 “ ries de plomb, et en avoit
 “ reçu inconsidérément les va-
 “ peurs.”

That the vapour, which ex-
 hales from melted lead, is capa-
 ble of exciting the disease,
 which is our present subject, is

a fact, frequently exemplified in the case of plumbers, and potters, and those who are employed in making *shot*. But farther, it is proved by the experience of printers, that the using *types*,* which have been suffered to stand too long before the fire, in order to dry them, has been followed by

* The *types* of printers have always some lead in their composition. Whilst I am correcting this sheet, Mr. Nichols, the printer, informs me of the following fact. "A cat, in a printing-office, is sometimes distressed for want of water. In this situation, he licks, every thing, that is in his way, in quest of moisture. If he happen to lick the *types*, immediate madness is the consequence : the certain cure of which is immersion in cold water."

weakness and contraction of the fingers. Nay, from several cases, which have been related to me on good authority, I have had reason to suspect, that the vapour of this metal, even when heated by friction only, has occasioned the colic of Poitou with all its consequences.

Boerhaave, who was particularly apprehensive of the dangers, arising from this poison, gives us a caution against the external application of the *acetum plumbi*, in the following words. “ Si dilutum corpori
 “ affricetur, pustulas, rubedines, erysipelas, phlegmonas,

“ multum levat ; cuti cando-
 “ rem, nitoremque conciliat ;
 “ sed corpori nocet, tandem in
 “ phthisin deducendo, ut tris-
 “ tissimis sæpe constitit exem-
 “ plis.” *Element. Chem. p. 3.*
vol. ii. proc. 172. And we
 want no authorities to testify,
 that the too fashionable appli-
 cation of cerusse to the skin
 has been followed by obstinate
 colics ; pains, tremors, and re-
 solution of the limbs ; slow
 wasting fevers ; and a pulmo-
 nary consumption. For such
 frequently has been the fate of
 those, who have thus endea-
 voured to supply the defects of
 their persons by a vain and
 temporary imitation of beauty ;

without having reflected, that health, as it is the only real source of beauty, so it is its only real preservative.

As it is observable, that the muscular parts of the human body suffer particularly from the saturnine poison, it may not be unworthy of our curiosity, and it is not foreign to our purpose, to enquire, in what manner they are affected by it.

Our muscles, in general, when in perfect health, are large, firm, and of a purple colour, with a considerable degree of transparency. When the body becomes weakened by

disease, the muscles generally become smaller and paler; more relaxed and flabby, with a tinge of a yellowish green; often entirely losing the purple colour. When a muscle is deprived of all power, or opportunity of acting, as in the case of palsy or of *anchyloses*, it then loses its colour and its size; but it becomes whiter, than in the former case: it is not so gelatinous or flabby: it still retains a transparency: and the muscular fibres become less distinct, as if steeped in a caustic alkali; while the other muscles, the action of which is preserved, retain their natural appearance. But those muscles,

which are become paralytic, either in consequence of working with the *calces* of lead, or having the salts of that metal applied to them in the living body, suffer the following changes. They lose their size ; they become dryer, or more tough ; and their fibrous texture becomes more distinct, as in a boiled muscle ; of a fine cream colour, and perfectly opake. Mr. Hunter, who communicated to me these observations, informed me, that he saw an instance of what is above described in Saint George's hospital. An house-painter was received into that hospital, on account of a broken thigh-bone ;

and died in three weeks after the accident. Mr. Hunter particularly examined the muscles of the hand and arm ; it having been observed, that those muscles, before death, were remarkably wasted. He found them all of a cream colour ; entirely opaque ; their fibres very distinct ; but dryer in their texture, and tougher than what is common. By this case he was induced to think, that all muscles, which have been for some time in a paralytic state, might put on these same appearances. But some experiments, which he has made upon dogs, incline him to an opinion, that those appearances are the peculiar ef-

fects of the poison of lead ; and that muscles, which lose their action from other causes, appear very differently. For he found, that by an application of *saccharum saturni* to the muscles of dogs, he, in a short time, could effect the same changes in them, which he had observed in the muscles of the painter above-mentioned.

It is well known, that quicksilver is often adulterated with lead ; and it is as certain, that sufficient care is not always taken in its purification. It has even been observed, that the use of this substance, as a medicine, has sometimes been fol-

lowed by the peculiar effects of saturnine preparations. It is therefore earnestly to be recommended to all, who apply quicksilver to the human body, to purify it by distillation.

III. *An Attempt towards an historical Account of that Species of spasmodic Colic, distinguished by the name of the Colic of Poitou.*

Read at the COLLEGE July 21, 1767.

PAULUS AEGINETA has been said to have been the first writer, who mentioned a species of colic, prevailing epidemically, and terminating in palsy, or in epilepsy. The testimony of this author is, “ that, in his
“ time, there raged a certain co-
“ lic, a new disease, which
“ took its rise in Italy, and in-
“ fested several parts of the
“ Roman territory, κατὰ λοιμικήν

τινα μετάδοσιν. In this disease,
 “ many became epileptic ; and
 “ others suffered a loss of mo-
 “ tion, the sense of feeling at
 “ the same time not being im-
 “ paired. The greatest num-
 “ ber of those, who had con-
 “ vulsions, died : but the para-
 “ lytic patients, for the most
 “ part, survived, as if by means
 “ of the cause being critically
 “ translated.” He adds, that,
 “ many recovered their power
 “ of motion in process of time ;
 “ but that others were cured
 “ with greater difficulty.” *See*
the third book of Paulus, chapter
18 and 43.

These passages of Paulus we

find referred to by Avicenna ; who likewise records, that the same species of colic had sometimes, in his own days, been epidemic. And, in another part of his book, he says more generally : “ Paralysis est crisis colicæ ; et multoties remanet sensus ; et qui evadit evadit cum paralysi ; et natura quasi illam materiam expellit, et reducit ad exteriora.”

But is it to be inferred from hence that this species of colic was absolutely a new disease in the time of Paulus ? Although he be the earliest author, who mentions it as epidemic, it can-

not easily be allowed, that physicians, who lived before his time, had not taken notice of the same *phænomena* in particular patients.

At what time, and in what place, lead, which is undoubtedly a specific cause of this malady, was first known to mankind, we have no tradition. “ Quis plumbum nigrum, et argentum vivum, et quo in loco invenerit, non est memoriæ proditum.” *Agricola de veteribus et novis metallis, lib. i.* However, the word μόλιβος occurs in Homer ; and we find Hippocrates, in several parts of his works, recommending the use

of lead, and the *scoriæ* of lead, as an epulotic application, and for other external purposes. Litharge of gold and cerusse enter the composition of powders, extolled by that author, as of great efficacy in defluxions of the eyes. It is likewise remarkable, that long before the age of chemistry, we meet with exact directions for making several preparations of lead ; and it is curious to observe that the method of preparing cerusse, described even by so ancient an author as Theophrastus, nearly corresponds with the modern process.

But, how much soever satur-

nine preparations might have been used for external diseases, it does not appear, that the internal use of them was recommended by any of the ancient, physicians. On the contrary, we find, that cerusse and litharge are ranked among poisons by Nicander, Dioscorides, Pliny, and Aetius. And Paulus Aegineta ascribes the very same effects to the filings of lead, as to litharge. How careful Vitruvius and Galen were with respect to this poison, has been already mentioned at large in a former Dissertation.

Nicander, the most ancient medical writer, next to

Hippocrates whose works are come down to us, has, in his *alexipharmaca*, given a very perfect description of the effects both of litharge, and of cerusse. Speaking of the former, he describes the colic, as the ordinary effect of that poison, in the following lines.

———— τότε γαστρί πέση βάρος· ἀμφὶ δὲ μέσσον
 Πνέυμα τ' ἀνελίσσουσιν κατ' ὀμφάλιον βρομέησιν,
 Οἷά περ εἰλίγλοιο δυσαλθέος, ὅς τε δαμάζει
 * Ἄνδρας ἀπροσφώτοισιν ἐνιπλήσσω ὀδύνησιν.
 Οὐ μὲν τῶν γ' ἔρων ἄνυλαι ῥύσις· ἀμφὶ δὲ γυῖα
 Πίμπραται· αὐτὰρ παμολίβῳ εἰδήνατο χροίην.

Under the article of cerusse,

* Dr. Bentley very ingeniously reads it—'Ἀνέρας ἀπροφώτοισιν.

the same author mentions the paralytic affection, which is the common consequence of that, and every preparation of lead, taken into the human stomach.

Ἄλλοι δ' ὑπναλέος ψύχει δέμας, εἰδὲ τε γυῖα
 Ὡς τοπάρους δονέει, καμάτῳ δ' ὑποδάμναται, εἰκων.

If, therefore, Nicander, if Dioscorides, and the rest of the ancient writers, whose observations on such poisons agree with those made by Nicander, ever saw the effects which they so well describe, it follows, that they could not be unacquainted with the colic of Poyt. An inquiry into the diseases of miners must undoubtedly have furnished them with

many instances of this species of colic. And indeed, it cannot be reasonably suspected, that Galen would, in several parts of his works, have shewn such an apprehension of the poison of lead, if he had not in his practice met with frequent examples of its most pernicious effects.

Francis Citois, who, I believe, was the first writer, who called the particular species of spasmodic colic, which is the subject of our present examination, *the colic of Poitou*, first published his *diatriba de novo et populari apud Pictones, dolore colico bilioso*, in the year 1617 ; as

appears in his dedication to his patron, the cardinal duke de Richlieu, prefixed to a collection of his treatises called *opuscula medica*. Thuanus, in the fifty-fourth book of his *historiæ sui temporis*, makes mention of this disease, and of Citois as the original writer concerning it. What he says of it, however, is very little more than a literal transcript from that author. Indeed there is reason to doubt whether what is said, in the histories of Thuanus, of the colic of Poitou, be not an interpolation of one of his editors. For Thuanus died in the year 1617, namely the very year in which Citois first pub-

lished his *diatriba* ; and accordingly we find, that the first notice taken of the colic of Poitou by Thuanus, is in a posthumous edition of his work, published in the year 1639.

According to Citois, the *dolor colicus Pictonicus* was a new epidemic disease, in the province of Poitou, about the year 1572 ; and after having prevailed in that province about 60 or 70 years, it became milder, less untractable, and by degrees was translated to other parts of France. In the *appendix* to his *diatriba*, he expressly says, “ Morbus iste, velut aves
“ peregrinæ, alio nunc magna

“ex parte avolavit ; et jam
 “magis Aurelianenses, quam
 “nostros Pictavenses vexare
 “dicitur.” And in his dissertation *de usu phlebotomiæ*, he has a chapter *de colico dolore biliosi apud Pictones* NUPER *populari*.

Thuanus fixes the precise time of its continuance, agreeing with Citois, that it began in the year 1572. “Per decennia
 “recrudescens, usque ad annum sextum sequentis seculi
 “violentior semper incubuit.”

Citois, in his treatise on this subject, after having mentioned several new diseases, which had lately been used as the in-

struments of God's vengeance on a sinful world, such as *lues venerea*, *sudor anglicus*, *plica polonica*, and the scurvy, descends to the consideration of the disease in question ; having first dropped an hint (seemingly to account for the *phænomenon*) that, to the great astonishment of astrologers, a new star, in the same year, had made its appearance in the constellation of Cassiopea. One cannot help taking notice of somewhat like a contradiction, or at least a want of precision in the history of the disease, as it is delivered by this author. " It was unknown," says he, " from the " time of Paulus, to that of

“ Avicenna, a period of 600 or 700 years ; and, after having “ been unobserved for the “ space of full 500 years more, “ it revived, with the same, or “ or even severer symptoms, “ in the province of Poitou.”

And yet he had before not only asserted, that it had been very common in all the province of la Guienne, but had produced the testimony of several authors to shew, that it had long before been observed at Paris, and in Picardy ; and that moreover Silesia, Moravia, and the greatest part of lower Germany, had been too well acquainted with this very cruel disease.

But, in fact, the supposition that the colic of Poitou was a new disease, about the time when Citois lived, is so far from being well founded, that it would not be difficult to prove, by the testimony of authors, the direct contrary to be true. For instance, the disease was mentioned by our countryman John of Gaddesden ; who appears to have written his *rosa anglica* early in the fourteenth century. Joannes Guinterius Andernacus, who published his translation of, and his commentaries on Paulus, in the year 1532, has the following note on that part of the eighteenth chapter of the third book of Paulus, where

the epidemic colic is mentioned. “ Quod Paulus suo
 “ tempore accidisse in morbo
 “ colico commemorat, nos quo-
 “ que nostra ætate frequenter
 “ videmus ; nempe ex magno
 “ diuturnoque colico cruciatu ar-
 “ tuum resolutionem, præsertim
 “ brachiorum, quanquam et
 “ crurum imbecillitas summa ad-
 “ fuerit.” And Coiter, who, in
 the year 1553, published his
Observationes anatomicæ et chirurgicæ miscellaneæ, testifies, that in
 Germany, and particularly in
 Franconia, and in the country
 about Nuremberg, this species
 of colic was, in his time, a
 frequent disease. Jacobus Oe-
 theus, in the year 1609, gave a

very accurate and circumstantial account of it. He affirms, that it was common in Franconia, in Austria, and particularly in the whole circle of Zwaabe. Paracelsus, who, in the midst of the most incomprehensible jargon, sometimes writes intelligibly, testifies, that “colica vel ex seipsa desinit, vel tollitur remediis, vel terminatur in paralyisin.” There is, in the same author, another passage, which I shall transcribe, on account of the just observations on this disease, which it contains. “Colica est, cum dolor, ac tormentum in ventre oboritur, cum contractione ejus, et ex-

“ crementorum suppressione,
 “ signisque aliis multis ratione
 “ stomachi et viscerum cætero-
 “ rum fientibus. Postea ma-
 “ lum transit in membra artus-
 “ que, in quibus hærens manus
 “ pedesque contrahit plus mi-
 “ nus, prout morbus magnus, et
 “ materia copiosa fuerit. Por-
 “ ro cum vi quadam sese dif-
 “ fundit ; et vel acuta vel chro-
 “ nica evadit, prout genera-
 “ tionis ejus natura est. Tan-
 “ dem sequitur consumptio
 “ corporis, mutatio vocis, et
 “ totius substantiæ imminutio.”

From these, and several
 other passages, which occur in
 the writings of Paracelsus, it

appears, that this man, who, early in the sixteenth century wandered over Germany, France, and Switzerland, was, perfectly acquainted with the species of colic, which is now under our consideration. For he represents it terminating in palsy, and a consumption of the whole substance of the body.

But it may reasonably be made a question, whether Paracelsus, who was very fond of saturnine medicines, in many diseases, and whose particular doctrine it was, that “ Saturnus “ purgat febres,” did not contribute to render this colic more frequent, than otherwise

it might have been. For, according to the testimony of Libavius, he often left his patients more diseased than he found them ; and it is acknowledged by his disciple Oporinus, that, when he was sent for to any town, in order that he might administer his internal medicines, he was very seldom suffered to make a long stay in it, on account of the general resentment of the inhabitants against him.

If modern times had not furnished similar instances, it would have been matter of astonishment to us, to have heard that Erasmus, the friend, the

correspondent, and the patient of our excellent Linacer, whose great skill in the science of physic he extols in several of his epistles, ever consulted in his own case, so wild, so illiterate an enthusiast, as Paracelsus appears to have been. But it is to be lamented, that in matters which relate to physic, even the most sensible part of mankind has ever shewn a degree of weakness, and credulity, easily imposed on by the self-importance of those who know how to recommend themselves to the world by bold promises ; and that diffidence, doubt, and hesitation, which help to constitute the true character of a

philosopher, have ruined both the fame and fortune of many an excellent physician.

A great number of other authors might be cited, who gave a full description of the colic of Poitou, before the time of Citois ; so that he ought not by any means to be esteemed the original writer on this subject. And if we consult authors, posterior to Citois, we find almost in every practical book this species of colic mentioned. We have an account in Sennertus, of its having prevailed epidemically, all over Silesia, in the year 1621. Baglivi even affirms, that “ ni-

“hil facilius colicæ supervenit,
 “quam paralysis.” And Wil-
 lis, in the pathological part of
 his treatise *de anima brutorum*,
 testifies that, “affectioni colicæ
 “crebro et gravius obnoxii
 “demum paralytici evadunt.
 “Causa adeo frequens hic ut
 “morbi hujus successio inter
 “illius prognostica habeatur ;
 “nam qui tormina in ventre,
 “aut paroxysmos atrociores,
 “per intervalla redeunt, pati
 “solent, tandem in habitu cor-
 “poris ac membris dolores va-
 “gos, deinde postea stupores,
 “et denique non raro ἀκίνησις,
 “sive resolutiones subeunt.”

A reader, conversant only

with books, and not having opportunities of observing diseases in themselves, would be apt, from such general assertions, to conclude, that every colic pain, if violent, does ordinarily, and in the common course of nature terminate in a paralytic affection. If this were really the case, it would follow, that Grashuis has given a true definition of the colic of Poitou, in the following words : “ Colica
 “ Pictonum designat dolorem
 “ colicum atrocissimum simul
 “ et pertinacissimum, ex qua-
 “ cunque causa oriundum.”
(Grashuis de colica Pictonum tentamen, p. ii.) But is it confirmed to us by experience, that every

violent pain in the bowels has the same characteristic marks ? Do we find, that the *ileus*, or that colic, which is produced by concretions of gall, sticking in the biliary ducts, terminates in palsy ? Is palsy the *crisis* of that colic which arises from a gouty, or an hysteric cause ? Those, who have attended the most accurately to nature, have made no such observation : and it seems only to be one species of colic, probably derived from one simple, uniform, specific cause, which has palsy and epilepsy for its pathognomonic symptoms.

Paulus refers the cause of the

colic, which he describes as epidemic in his time, to thin acrimonious humours. Citois, in considering the causes of the colic of Poitou, though he cursorily mentions several concurring causes, seems to lay the greatest stress on the sour, unripe, austere wine of that province. This degeneracy of the wine he attributes to the excessive violence of the north wind, which had prevailed for some years; and to frosts, which had begun, before the autumn had been nearly ended; and which had continued until the spring had been far advanced. This opinion he confirms by an observation, that the

mendicant friars of all orders, who were obliged to drink the very worst wines, were more particularly subject to the colic. He gives an history of thirteen friars of the order of St. Bernard, belonging to the abbey Noaillé, who were most severely tortured by this disease ; for that, having before been accustomed to drink the good and wholesome wines of Languedoc, they had been reduced to the necessity of drinking the wines of Poitou, “ which
“ were,” says he, “ white
“ wines, very unripe.” These religious men, being removed to other provinces, speedily recovered their health.

According to Citois, this disease was more frequent in autumn, than in any other season ; more severe to women, than men (though women were less frequently attacked by it) ; to the old, than young ; to foreigners, than natives ; in winter, than in summer.

If we examine the writers, who lived before Citois, as well as those who followed him, we find a general suspicion prevailing, that the mischief was done by some noxious quality in wine. Here and there we find an adulteration suspected ; but the greatest number of writers, copying one the other,

have referred the mischief to the wine itself ; some, on account of its strength and sweetness ; others, on account of its acidity. Crato (*consil. med.* 10) giving his advice to a patient, subject to this colic, says, “ vi-
 “ num omne suspectum impri-
 “ mis autem moravica noxia
 “ sunt, et nativum quiddam,
 “ quod hunc morbum conciliat,
 “ in se continent. Hinc tot
 “ colicos et paralyticos in Mo-
 “ ravia videmus. Nec ab hac
 “ malitia absunt austriaca, nisi
 “ bene atque sæpe sint elutriata.
 “ Dulcia, crassa, et turbida plu-
 “ rimum nocent ; rhenensia
 “ pura, matura, *non contaminata*
 “ *hominum fraude*, innocentis-

“ *sima sunt.*” Wepfer, in the
annus secundus of the *ephemerides*
germanicæ, has given a disserta-
 tion on the subject of *paresis*
post colicam ex vino. “ Patients,”
 “ says he, “ labouring under a
 “ bilious colic, which is apt to
 “ end in palsy, give me great
 “ trouble ; but this happens
 “ abroad, rather than at home.
 “ For the people of Swisser-
 “ land generally drink red
 “ wine, well ripened, and ge-
 “ nerous. If any person, by
 “ chance, happens to be affec-
 “ ted by a colic in the country
 “ about Scafhausen, he never,
 “ to my knowledge, becomes
 “ paralytic ; nor can I find that
 “ this has ever been the case

“ hereabouts, having examined
“ the medical annals of one
“ hundred years past. The
“ people of this country are
“ subject neither to the gout,
“ the stone, nor convulsions. I
“ have hitherto ascribed such
“ an exemption from these dis-
“ eases to their drinking our
“ wholesome red wines. On
“ the contrary, where white
“ wines are drunk, this species
“ of colic is very frequent ;
“ viz. in Alsace, near the lac
“ de Zel, and in the duchy
“ of Wirtemberg. There are
“ likewise in those parts a
“ greater number of gouty and
“ nephritic patients ; and peo-
“ ple of both sexes are more

“ liable to convulsions. There
 “ is a monastery near us, where
 “ the fathers drink no other
 “ than white wine. Scarce
 “ one of them escapes the at-
 “ tacks of this colic. Not long
 “ ago several Dominican friars
 “ were affected by this disease,
 “ after drinking the wine of
 “ Alsace : and, convulsions
 “ coming on, they were all
 “ killed by it. I have suspec-
 “ ted the cause to have been
 “ the *tænia sulphurata dulcis*, that
 “ is, bismuth mixed with sul-
 “ phur applied to the fumiga-
 “ tion of wine. The same cause
 “ had formerly been suspected
 “ by Thomas Jordanus, as the
 “ source of this disease in

“ Moravia ; on account of
 “ a supposed similitude in
 “ the effects of bismuth, and
 “ lead.”

It seems wonderful to find, how very little, physicians, even of the first reputation, formerly knew of the deleterious qualities of lead. Ferne-lius, who published his *universa medicina* in the year 1592, although in his seventh chapter *de luis venereæ curatione*, he describes most terrible effects of the powder of lead, given, in the quantity of a pound and half, in the space of fifteen days, to his friend, as a remedy against the gout ; (which effects

he attributes to the hidden and inexplicable malignity of that metal; and concludes from that case, that lead ought never to be taken into the body) in the very same page, when he describes the true colic of Poitou, in the case of a painter of Anjou, in the year 1557, plainly shews, that neither he, nor any of the other physicians concerned, understood the true cause of the disease. He supposes it to have been occasioned by cinabar mixed in the painter's colours; and seems to treat his brethren very contemptuously, for having differed from him in their judgment; some of them having suspected the *pituita vi-*

trea, and others the acrimony of the bile, to be the cause of the disease,

Wherever indeed we turn our eyes among books, we find very great marks of ignorance concerning this subject. Ramazzini, who professeth to have inquired accurately into the causes of those diseases, to which the various artificers are subject, wonders extremely how it should happen, that since lead furnisheth us with excellent remedies, for internal as well as external purposes, the potters should suffer so cruelly from the exhalation of this metal, in doing their work.

(*Ramazzinus de figulorum morbis.*)

But in fact, writers of much greater accuracy and correctness, than Ramazzini, have given instances of a similar inattention on this subject.

The almost general silence of old authors, particularly of the German physicians, with respect to the adulterations of wines, is not easily accounted for. We find, that, in the year 1487, there was a *recessus imperii* promulged at Rotenberg; and, in the year 1498, at Friberg; which was enacted, in the year 1500, at Tubingen; and, in the year 1508, at Frankfort; and, in the year

1577, in the same place ; by which decrees it was made a capital crime to adulterate wines with litharge, or to use bismuth in the fumigation of them ; it having been, at several periods, represented to the Emperors, that great mischief had been done by such mixtures ; and that they had been the cause of insuperable and mortal diseases. It should seem, that these laws were not carried into strict execution ; and indeed that, in the latter end of the last century, it was hardly known in Germany that any such laws subsisted ; or, at least, that they were regarded as antiquated laws ; and that

the principles, on which they had been enacted, were wholly forgotten. For, in the *ephemerides germanicæ*, we find, about the latter end of the last century, the physicians taking pains in inquiring into the cause of an epidemic colic, which had for some time prevailed in various parts of Germany, more especially in the duchy of Wirtemberg. Many causes were suspected, particularly the culinary vessels, on account of copper ; which vessels were therefore ordered to be carefully lined with tin. But the disease still continued ; and, no cause having been discovered, at length it was impu-

ted to witchcraft. After many fruitless conjectures, it was plainly found out, on what 'this epidemic disease had really depended. The vintners, in order to correct their sour, austere wines, and make them palatable, had practised a method of mixing litharge with them. Among some, we find it was the custom to throw into their casks litharge in substance. Others first impregnated vinegar with litharge ; and then added this vinegar to their wines in a certain proportion. The method, and the proportion are described by Cockelius in the thirtieth observation of the *annus quartus* of the *epheme-*

rides germanicæ. The ninety-second observation of the same year, by Brunnerus, is on the same subject; and the hundredth observation, of the same year, by Vicarius,* contains several curious particulars concerning the discovered adulteration, and its effects on the human body. Reiseliuss, in the 251st observation of the *annus quintus et sextus*, has more on the same subject. A representation of these facts having

* This author supposes this method of adulteration to have been a modern fraud; but he acknowledges that he had been informed by the elder Wepfer, that the same fraud had formerly been practised on beer which had turned sour.

been made to the duke of Wirtemberg, by a decree, bearing date March 10, 1696, it was made a capital crime to mix litharge with wine, or even to sell litharge in the shops. But notwithstanding the severity of this law, we are informed by Zeller, that, in the year 1705, the same dangerous experiments were repeated in the circle of Zwaabe, with a view to correct the acidity of the weaker wines. And it is certain, that in France, as well as in Germany, the same adulteration is practised even at this day, in defiance of laws, and in opposition to the dictates of humanity.

I do not undertake to demonstrate that the same frauds were practised formerly on the wines of Poitou ; and that from thence was derived the real cause of the disease, described by Citois. But if we take into our consideration what is said of the *vina pictavensia alba*, by Hoffmann, that “ multum conveniunt cum rhenanis, tantum in eo inferiora hisce, quod sint crudiora ;” and that therefore such crude wines were likely subjects of such adulteration ; if we reflect, that, the art of improving wine, by a mixture of litharge, had been practised and prohibited in Germany, many years before the time of Citois ;

if we take into our account likewise, what seems more than probable, that the farmers of Poitou might have endeavoured to make their wines less acid, by a decoction of their Must ; and if we compare the genuine effects of the adulterated wine of the dutchy of Wirtemberg with the description of the *dolor colicus pictonicus*, described by Citois ; from a very remarkable similarity of circumstances, and of effects, we may perhaps be led to conjecture, that the colic of Poitou, and of the dutchy of Wirtemberg, were produced by one and the same cause.

Upon the same principles, perhaps, we may be enabled to assign a probable reason, why this disease was much less frequent among the ancients, than it has been in more modern times.

The ancients, in manufacturing their wines (which they seem to have done in an unskilful manner) made use of various *condimenta*; with a view to bring them sooner to maturity; to take off their ropiness; to correct their acidity; and, in general, to improve their colour, their smell, and their taste. The substances, applied by them to these

uses, appear to have been innocent. Pliny however, intimates, that the people of the *Narbonensis Gallia* (one of the four quarters of ancient Gaul, which contained Savoy, Dauphiné, Languedoc, and Provence) had secret and pernicious methods of adulterating their wines: and that they “*officinam ejus rei fecere, tingentes fumo, utinamque non et herbis et medicamentis noxiis.*” But there seems to be no reason to imagine, that any of the ancients ever made this use of litharge. Nor indeed, being under such apprehensions of its poisonous qualities, would they probably have

dared to have mixed this substance with their liquor, even if they had been acquainted with its power of correcting acidity, and of communicating to the crude wines a finer colour, and more generous flavour.

However, if we inquire into the method of treating the wines, of inferior note, practised by the ancients, we find reason to conclude, that the liquor, thus treated could not be entirely free from a solution of lead.

It cannot easily be ascertained, at what time the method of boiling the unfermented

juice of the grape was first introduced. In reading the ancient poets, we meet with very frequent allusions to such a custom ; and some of the Roman authors, who have professedly written *de re rustica*, have given particular directions, concerning the method of conducting this process. Several likewise of the Greeks, as we are informed by Pliny, namely Euphronius, Aristomachus, Corniades, and Hicesius, had published precepts on the same subject.

According to the rules given by Columella, the Must was to be boiled down, until a fourth,

or a third, or more was consumed ; and then several ingredients having been added to it, was generally set apart for a year, as a medicament, to be mixed with wines, as occasion might require with a view either to preserve them to a great age, or to cure them when they were suspected to be in danger of turning sour. Palladius distinguishes this inspissated Must into three sorts ; to which he gives different names. The first sort he calls simply *defrutum* ; *ubi ad spissitudinem fortiter despumaverit ;* the second sort, *carænum* ; *“ cum tertitia perditæ, duæ partes remanserint ;* the third, *sapa* ;

“ ubi ad tertias redacta descen-
 “ derit.” (*Palladii October, Tit.*
xviii.) Columella sometimes
 seems to make a distinction be-
 tween *defrutum* and *sapa* ; but
 often uses them indifferently as
 synonymous terms. But strictly
 speaking they are different ;*
sapa being *defrutum* reduced to
 the consistence of a syrup ; or,
 according to Virgil’s expression,
igni multo pingue.

* The *sapa* is still used in Italy, and is
 kept in bottles, in order to be put into sal-
 lads, and some sorts of sauces. At Na-
 ples, it is called *musto cotto* ; but in Tusca-
 ny, it retains its old name *sapa* ; and
 there, as formerly, they mix with it spices
 and other ingredients. .

It was usual to add a certain proportion of this boiled Must to each *amphora* of the new wine, which required to be medicated ; more or less according to its strength. Some farmers, as Columella informs us, mixed with their new wine one fourth part of *defrutum*. This they were obliged to do on account of the weakness of their wine ; which, according to Columella, could not otherwise have been kept sound thirty days.

But it is very remarkable, that leaden vessels are, by several ancient authors, mentioned as proper for the preparation of

this *defrutum*. We find in M. Cato (*de re rustica*, *cap. cvi.*) the following directions for making Greek wine, at a distance from the sea. “ Vinum græcum sic
 “ facito. Musti quadrantalia
 “ xx in aheneum, aut plum-
 “ beum infundito. Ignem,
 “ subdito.” And again, *in cap. cvii.*, “ sapæ congios vj quam
 “ optime infundito in aheneum,
 “ aut plumbeum.” But Columella (*de re rustica*, *lib. xii. cap. xx.*) expressly orders, that the *vasa defrutaria* should be leaden, and not of copper, for this reason ; because copper vessels are apt to communicate to the preparation a taste of verdigrise. “ Ipsa vasa, quibus sapa

“ aut defrutum coquitur, plum-
 “ bea potius quam ænea esse
 “ debent ; nam in coctura æru-
 “ ginem remittunt ænea.” The
 same directions are given by
 Pliny ; who orders absolutely
 that the *defruta* and *sapæ* should
 be prepared “ plumbeis vasis,
 “ non æneis.”

It is observable, that particu-
 lar directions are given by Co-
 lumella, that this decoction
 should be performed in a cau-
 tious manner : and that he re-
 commends a particular attention
 “ ne plumbeum perforetur.”
 And in order to prevent a per-
 foration of the lead, he advises,
 that the first part of the process

be performed by a gentle fire. He advises, likewise, that the person, to whose care the decoction of the Must is committed, during the whole time of its boiling, stir the liquor continually, in order to prevent any thing sticking to the bottom, which may endanger the vessel. When the vessel can bear a stronger heat, that is when the ebullition begins (*cum aliqua jam parte mustum excoctum in se fervebit*) he directs that a larger fire be made, care being taken that the vessel do not come in contact with the fuel. “ If this be not avoided,” says he, “ either the vessel
 “ will be melted ; or, if that

“ does not happen, the Must
 “ will be burnt, and contract a
 “ bitter taste.”

It will hardly be doubted, but that the juice of the grape, thus evaporated in leaden vessels, must have dissolved some of the metal ; and it should seem, that the wine, manufactured in the manner above described, must have been prejudicial to those, who drank it, in proportion to the quantity of *defrutum* or *sapa* mixed with it. Pliny, therefore, had probably found reason for making so severe an animadversion on wine in general. “ Tot veneficiis
 “ placere cogitur ; et miramur

“noxium esse?” *C. Plinii Secundi naturalis historiæ, lib. xiv. cap. xx.*

Here then a cause is discovered, which may reasonably be supposed to have sometimes occasioned the colic of Poitou, among the ancients. But it is really astonishing to find, that, notwithstanding all that had been written against lead, and its preparations, not only a popular practice, of boiling this liquor in leaden vessels, should so long have prevailed; but that such a practice, should stand approved and recommended in the work of a philosopher. Is it not probable, that

Columella (who, in several passages in his book, appears to have been in the interest of the farmers, and a friend* to adulterations) had learned by experience, that a peculiar advantage was gained by boiling Must in lead ; and that the *defrutum*, in this, manner prepared, had a particular efficacy in preventing, or in suppressing the acetous fermentation in the weaker wines ? Indeed it seems likely, that the farmers

* “ Cavendum est ne conditus sapor
 “ intelligatur : nam ea res emptorem fu-
 “ gat” *Columella in l. xii. c. xx.* “ Cura
 “ adhibenda, ut Mustum perenne sit, aut
 “ saltem usque ad venditionem durabile.”
Idem in l. xii. c. xix.

themselves were not unacquainted with the operation of acids on lead ; since it appears to have been a common experiment among them to put a plate of lead into a cask of wine, in order to determine, whether or not the liquor was inclined to be sour. “ In vitium inclinantis experimentum est lamina plumbea : mutatur in ea color.” (*Plin. nat. hist. lib. xiv. cap. xx.*)

But, in general, if we inquire into the chances, which the ancients had of being injured in their health by means of the poison of lead, we find them to have been much fewer,

than mankind, in more 'modern times, has incurred ; and it appears that such chances have been multiplied among us, in proportion as improvements in several articles of convenience and luxury have been introduced.

Ramazzini informs us, “ ar-
 “ tificium fictilia vitreandi anti-
 “ quissimum fuisse, uti ex eru-
 “ tis e terræ visceribus con-
 “ stat.” If, by the words *ar-
 tificium vitreandi*, Ramazzini
 meant the art of glazing the
 earthen ware, according to the
 present method, principally by
 the means of a preparation of
 lead, he probably was mistaken.

The art of forming clay into vessels seems to have been one of the earliest inventions of man ; but this method of covering the surfaces of such vessels, I conjecture to be a modern improvement, which the world was not acquainted with, before the age of chemistry. That part of the old earthen ware, preserved in the British Museum, which is supposed to have been of Roman Manufacture, is not glazed. · Those vessels, which are called Etruscan, and which are supposed to be of greater antiquity than the Roman, have indeed a paint or polish on their surfaces ; but that does not appear to resem-

ble our modern saturnine vitrification.

If then the ancients were ignorant of this art, it seems probable, that their ignorance, in this instance, contributed its part towards securing them from the colic of Poitou. For it has been already observed, that lead, in its vitreous state, is very soluble by acids. And it is well known, that potters, who are exposed to the vapours of this metal, while the process of glazing is performed, are particularly subject to that disease.

Add to this consideration,

that the quantity of cerusse, used by the ancients, must have fallen infinitely short of the present consumption of it ; that they were wholly ignorant of various arts and manufactures, in which lead is now used ; and that it is not proved by any authority, that they ever administered saturnine preparations, as internal remedies. A comparison of the various fashions and customs, and of the various modes of luxury, which prevailed among the ancients, with those which now prevail, would suggest to us many other probable causes, why this disease, which at present occurs to our observation almost every

day, was not so frequent in past ages. To examine minutely the several parts of such a comparison, would be a curious and an entertaining inquiry.

It would be vain to conjecture, by what means this disease became so general in the days of Paulus Aegineta ; since neither he, nor any of his contemporary writers have left materials, on which a probable supposition, concerning this subject, can be founded. But Avicenna (between whose time and that of Paulus no author is supposed to have described this colic) informs us, by what means it may reasonably be sus-

pected to have infested his contemporaries. For he testifies, that the women used litharge as a domestic remedy for their children ; and that it was a common practice to put litharge into water, when it was suspected of being unwholesome. His words are, “ *Mulieres nos-*
“ *trates propinant lithargyrium*
“ *pueris, adversus alvi fluxum,*
“ *et ulcera intestinorum. Eæ-*
“ *dem subinde ipsum poculis*
“ *aquæ injiciunt, ut vis aquæ*
“ *noxia obtundatur.*” He, however, calls litharge “ *lethale*
“ *medicamentum, urinam sis-*
“ *tens, ventrem et ureteres in-*
“ *flans, et distendens, respira-*
“ *tionem coarctans.*” I find no

earlier account, than this, of lead having been used as an internal remedy even by women, or by empirics. And it seems probable, that from such practitioners the internal use of it, as a medicine, was originally borrowed ; and that it was by degrees introduced into pharmacopœias, and the legitimate practice of physicians.

From what has been premised, it appears, that, in the earlier ages of the world, the colic of Poitou, although not unknown, was not a frequent disease ; that it was originally described by authors of great antiquity, as the ordinary effect of

the poison of lead ; and that during a course of many years, it was no otherwise mentioned in books, than as the effect of that poison. It appears likewise, that, as luxury and refinement, and fraud, increased in the world, this poison had more frequent opportunities of exerting its virulence on the human body ; and that therefore the disorder by degrees became more and more common. I am sorry likewise to add, that there appears to be abundant reason to suspect, that the art of medicine itself has contributed its part towards propagating this colic, by borrowing from the class of poisons a substance,

which, however efficacious it may have been in some violent complaints, has not hitherto been convertible into a safe remedy.

IV. *An examination of the several Causes, to which the Colic of Poitou has been attributed.*

Read at the COLLEGE August 7, 1767.

THE eighth and ninth volumes of *la bibliothèque raisonnée*, published in the year 1732, contain a long dissertation concerning the colic of Poitou. In the year 1757, there appeared a Latin treatise on the same subject, written by a physician of distinguished reputation. These two pieces, besides other marks of resemblance between them, agree very much with respect

to the remote causes, to which this disease is referred, in both. This induced M. Poissonier Desperrieres, in his letter, inserted in *le journal des scavans*, for the month of February, 1758, to imagine, that both treatises were written by the same author. But it appears, that the dissertation, which is in *la bibliothèque raisonnée*, was the composition of M. Massuet.

In examining the several supposed causes, to which this disease has been attributed, I propose to follow the order, which is observed in the Latin treatise above-mentioned; and I shall hope to be excused by

the learned author, if, after having impartially considered the doctrine, I find myself in no degree convinced by the general reasoning contained in his book.

The first cause, here mentioned, is “ the remains of fevers, the crisis of which has been imperfect ; or which have not been properly treated.”

The author, in order to establish this as a practical observation, first appeals to the testimony of several writers. But it is to be remarked, that Fernelius, who is the first writer cited,

although he does observe, that a colic is apt to succeed tedious fevers, particularly those of a bilious kind, does not here assert, that such fevers are followed by a colic, the nature of which is to terminate in palsy. And indeed, if it can be shewn, that, in any part of his *universa medicina*, he has made such an assertion, nothing more will be proved by a quotation from Fernelius, than that such was the opinion of a very fallible writer.

Ballonius, who is next introduced as having made a similar observation, testifies, that he found this consequence of a

fever particularly in those patients, who, tired of their disease, and desirous at once to extinguish the flame, had recourse to the assistance of women and empirics. What instruments such practitioners made use of in the time of Bal-lonius, it will be obvious for any person to conjecture, who knows how much several preparations of lead have been extolled by women and empirics, on account of their supposed febrifuge power. Indeed, it was not only the doctrine of Paracelsus, and the other empirics of former times, that “ Sa-
“ turnus purgat febres ;” but even physicians, of the first

class, have spoken of lead with very high praises of its efficacy in curing fevers. We find Pitcairn, in his *elementa medicinæ*, placing sugar of lead among *remedia rarescentiam nimiam sedantia*. It is by this author ranked with purified nitre, spirit of sulphur, juice of lemons, distilled vinegar, emulsions of the four greater cold seeds, and *vesicantia*. It was common to give to a patient one scruple of sugar of lead immediately before the expected time of the paroxysm of a quartan fever. And there was a certain preparation of lead, called *butyrum bezoardicum saturninum*, which was greatly trusted

to in malignant fevers. Nay Etzlerus was so fond of lead in all diseases, both acute and chronic, as to have made use of the following very strong expression in recommendation of its virtues : “ ex eo conficiuntur medicamenta facientia ad longævitatem.”

A case is afterwards cited by our author from Carolus Piso, of a young man, who from a tertian fever fell into a quotidian, attended with colic pains ; which after having continued forty days, were succeeded by palsy in the arm, and afterwards by convulsions, and death. But it is worthy of notice, that

Carolus Piso, in the same page, mentions the termination of a colic in palsy as a common occurrence ; and that he appeals to an observation, made by his father, Nicholas Piso, that, in the province of Lorraine, such a species of colic was particularly endemial : that the inhabitants likewise of Melun were very subject to it ; and that it would be tedious to enumerate singly all the patients, whom he had seen thus affected.

We are informed by the same author, Carolus Piso, that he had visited two convents ; one in the year 1596 ; the other, seven years after that time ; and

that, in both houses, he had found the monks most miserably affected, some with colic pains ; others with palsy of their arms, which hung useless from their shoulders ; others frequently harassed with convulsions ; others in a lethargic state. He does indeed mention (probably to save his theory) that they had some degree of fever ; but that, to use his own words, was *valde mediocris*. His notion was, that the disease, which he found so common in those monasteries, was apt sometimes to succeed the declension of tertian fevers ; and that, at other times, it was complicated with tertian fevers. But in the pre-

ceding paragraph, he seems to have approached much nearer to the true cause; when he mentions the free manner of living, which he observed among the seniors of the convent, who are said to have been the only persons in it, who suffered by this disease; for the junior monks, who were kept under restraint, and to whom very little or no wine was allowed, enjoyed perfect health, free both from fever and colic.

To the testimony of several other writers, which tend to prove no more, than those testimonies, which have already been examined, the author adds

the result of his own experience. And he here asserts, that the bilious fever, which, in the year 1727, raged at Amsterdam, being suppressed by the use of the peruvian bark, given while the putrid bile was turgid, violently affected the mesentery, and membranes of the intestines; and that the presence of the colic of Poitou was a proof that the bilious fever had preceded; the remains of which fever, having continued several years, had made that species of colic familiar to the physicians of Amsterdam. If we turn to another part of this work, we find a very different reason given, why this

disease was common at Amsterdam. It is there referred to rain-water impregnated with the lead of the roofs of the houses. “ Et hæc est ratio, quare
 ‘ insolitus olim, colicus dolor
 ‘ grassetur nunc Amsteloda-
 ‘ mi.”

Ettmuller, in the twenty-sixth case of his *collegium consultatorium*, relates the following history. A person, who laboured under a double quartan fever, had, by the advice of his physicians, taken the powder of the peruvian bark, by which the paroxysms had several times been prevented ; but still the fever had afterwards returned.

Ettmuller, having found other medicines ineffectual, gave his patient, on the days when he expected the paroxysm, eighteen grains of sugar of lead, in two doses ; by which medicine repeated several times, the fever was at length subdued. Hereupon followed an obstinate constipation of the bowels, together with a convulsive colic. Some medicines, which the physician administered, relieved these disorders ; but nevertheless, for some time afterwards, at the usual hour of the paroxysm, he suffered returns of a periodical colic. The author accounts for this effect, by supposing that the febrile fer-

ment had been prematurely fixed and concentrated by the sugar of lead. Had the circumstance of the administration of sugar of lead been omitted in this history, how plausibly might it have been urged in support of a theory, which experience has not hitherto established !

Poisons are the second of the supposed causes of this disease.

That the poison of lead is capable of producing the colic of Poitou, is an obvious truth, which can admit of no controversy. But let us see, whether

or not there be any reason for a commonly received opinion, that other metals have a similar power. Our author supports such an opinion ; and appeals to the authority of Joh. Jac. Scheuchzerus, in order to prove that the same effects may be produced by copper. Scheuchzerus, in his *itinerarium alpinum*, *it. i. an.* 1702, *p.* 17, speaks of a monastery, the inhabitants of which were almost universally seized with a spasmodic colic, which terminated in palsy. The water of this monastery is said to have been pure ; and the wine not to have been adulterated with litharge, or any other poison. But it ap-

peared, that the culinary vessels, used for the purpose either of preparing or of keeping the victuals, were all made of copper ; and that the tin, with which they had been lined, was worn off. And hence it was concluded, that copper had been the cause of this malady.

It is certain that copper is soluble by all acids ; by alkalis both fixed and volatile ; by the neutral saline liquors ; and by oils ; and that even common water, suffered to stand long in vessels of copper extracts so much of it, as to gain a taste of the metal. But the

constant effect of any small quantity of verdigrise, or vitriol of copper, taken into the stomach, is immediate on the stomach itself, and on the intestines. Neuumann knew a person, who, having accidentally swallowed a sleeve-button of brass, was seized with violent disorders in the first passages, and died in agonies. Vehement vomitings, and even convulsions, have been excited in children by the *unguentum ægyptiacum*, the *basis* of which is verdigrise, applied to ulcers of the mouth ; some of the ointment having been accidentally swallowed. Small doses of the blue vitriol have frequently

been administered, as a remedy in intermitting fevers, and in epilepsies. Several cases are mentioned, which have thus been successfully treated ; the medicine having acted as a powerful emetic. But I do not hear of any experiments, which tend to prove, that the preparations of copper are productive of the colic of Poitou. It is therefore most reasonable to conclude, that that metal was unjustly suspected by Scheuchzerus.

Antimony has likewise been condemned, as productive of this species of colic ; and our author adds to an history, cited

from Mercurialis, a case, which fell under his own observation, tending to shew, that antimony had really been the cause of this colic. A sea-surgeon, who had for several weeks, taken some grains of crude antimony, every day, was seized with a colic, which ended in a paralytic affection of his hands and feet. It has been the fate of this substance very frequently to incur the suspicion of being poisonous. It was proscribed by a decree of the faculty of physic at Paris, followed by an *arrêt du parlement*, in the year 1556. Paulmier de Caen, physician at Paris, was degraded in 1609, for having given anti-

mony; which, however, in 1637, was by the faculty classed among remedies, in a book published under their authority. At length, in 1666, the decree and arrêt were revoked. But here we find antimony again arraigned, after having long had the character of an innocent ineffective medicine. Probably the truth was, either that the sea-surgeon, whose case is mentioned, had taken the native mineral, which having not been purified, might contain some particles of lead ore; (for this is said to be the case of the English antimony in general) or, what is a more likely supposi-

tion, that the disease owed its origin to another unsuspected accident.

Nor is there any foundation for us to imagine, that this disease was ever occasioned, as has been supposed, by the *effluvia* of antimony in the mines. We are informed that the ordinary effects of antimonial *effluvia* are suffocation, apoplexy, vomiting, *diarrhæa*, loosening of the teeth, and salivation:—very different effects from those to which persons are subject, who inspire the exhalations of lead. Salivation, mentioned by Siemens in his dissertation *de metallurgia morbifica*, as hav-

ing been often raised by the fumes of antimony, has been generally regarded as the specific operation of mercury only. But Dr. James lately informed me, that for sixteen years last past, his fever powder has contained no mercury ; and yet that, within that space of time, he has known at least six instances of a salivation raised by his medicine. He added, that the patients, who were thus salivated, had neither their teeth loosened, nor their breath made offensive ; as happens in a mercurial ptyalism.

It has been likewise supposed, that the fumes of mercury

are productive of this colic. Having made a particular enquiry, concerning this fact among the gilders on copper and silver, I find, that they, who stand over the fire, while the mercury evaporates, are, in general, pale and cachetic ; that they are much affected with tremors and debility, particularly in their hands ; and that, when the disease is confirmed, like patients labouring under the *chorea sancti Viti*, they have no command over the muscles, which naturally obey the will. It is denied, that, in general, these artists are subject to colic or costiveness. But if they sometimes suffer pains

in their bowels ; nay if it even can be proved, that a gilder, on copper or silver, has now and then been affected with the colic of Poitou ; may not such an effect very reasonably be imputed to the poison of lead, with which mercury is known to be frequently adulterated ?

Those, who work in the mines of quicksilver, ordinarily suffer diseases, similar to what we observe in gilders on copper and silver. Fallopius, in his treatise on metals and fossils, informs us, that these miners hardly ever live three years ; and Ettmuller, in his *mineralogia*, testifies, that they

fall into tremors of their limbs ;
 and that they are affected with
 asthma, and vertigo, and palsy.
 Islemann, in his dissertation *de
 colica saturnina*, insists, that,
 unless we use the term *mercury*
 in the sense in which it was
 used by Paracelsus, and under-
 stand by it every thing which
 arises in form of smoke from
 mineral substances, there can
 be no reason to attribute the
 colic of Poitou to mercury.
 “ It cannot,” says he, “ be sus-
 “ pected of being the cause of it
 “ among our miners : it being
 “ well known, that quicksilver
 “ is not, in Germany, found in
 “ the mines of other metals.
 “ But the effects of the vapour

“ of quicksilver differ widely
 “ from this disease. Adficiuntur
 “ hydrargyri effluvia qui hause-
 “ runt, lipothymia, sudore fri-
 “ gido, convulsionibus, ἀναισθη-
 “ σία, apoplexia, epilepsia, et
 “ præsertim artuum tremore,
 “ paralyti, ptyalismo, et den-
 “ tium vacillatione. Respon-
 “ dere quidem nonnulla horum,
 “ quæ enarravimus, symptomata-
 “ tum morbi nostri indoli pri-
 “ mo intuitu videbuntur; ast
 “ curatius rem si perpenderi-
 “ mus, differentia eorum haud
 “ difficile adparebit. Quæ enim
 “ ab hausto mercurio oriri so-
 “ lent convulsiones, paralyses,
 “ sudores frigidi, lipothymia, et
 “ ex idiopathia, absque præ-

“ gressis gravioribus malis,
 “ ægros infestant ; cum e con-
 “ tra eadem morbum nostrum
 “ symptomatice, precedentibus
 “ nimirum ventriculi et intesti-
 “ norum doloribus, a mercurii
 “ vapore minime oriri solitis,
 “ subsequantur.”

We cannot wonder at Dios-
 corides, who in his earlier time,
 asserted, ὑδράργυρον ποθεῖσαν τὰ αὐτὰ
 ἐπιφέρειν τῇ λιθαργύρῳ but we could
 hardly find an excuse for one,
 who should, in the present age
 of experiment, content himself
 with subscribing to such an
 opinion, without giving him-
 self the trouble of a more parti-
 cular examination.

M. du Bois, in his *thesis*, intitled *non ergo colicis figulis venæ sectio*, seems to be confirmed in an opinion, that all the metals, and many other fossil substances, are capable of exciting this same species of colic. “Æris, “plumbi, stanni, argenti atque “auri fabris eadem impendet “lucri poena. Simili causa, “parique modo plectuntur, qui “crystallo, speculis, marmori, “gemmis aut cædendis aut po- “liendis operam navant.” To this I shall only reply, that since M. du Bois has ascribed the very same effects to such a multiplicity of causes, contrary to the general observation of others, it should seem not un-

reasonable to conclude, that many of the twelve hundred patients, whom, in the space of twenty three years, this physician attended in the hospital of *la Charité*, with so inconsiderable a loss, were not really affected with the genuine colic of Poitou.

What relates to the third supposed remote cause, namely *the abuse of wine, and of other sour and austere fermented liquors, and of unripe acids*, has been sufficiently considered in *an enquiry concerning the cause of the endemial colic of Devonshire*. Nor does it seem necessary, in this

place, to enter afresh into a discussion of that subject.

The fourth of the remote causes, mentioned in this Latin treatise is the gout and rheumatism.

Perhaps there may be some reason to think, that a disposition to the gout, which seems to be a disease of the spasmodic kind, may be increased by the same cause, on which this species of spasmodic colic depends. However this may be, it is very certain, that pains in the limbs are constant symptoms of the colic of Poitou. These pains

are generally antecedent to the paralytic affection : and, as well as the colic itself, are apt to cease, and to return again at intervals. They sometimes, though rarely, fix for a short time in a particular limb ; there bring on a slight inflammation, and personate the gout. A remarkable connection, or sympathy, subsisting between the bowels and the limbs, has very frequently been observed. A person shall suffer pains in his intestines, in consequence of being wet in his feet. A dysentery, injudiciously treated, shall be changed into a rheumatism. Dr. Akenside saw, in St. Thomas's hospital, so

many instances of a translation of disease from the limbs to the bowels, and *vice versa*, that he is induced to call a species of dysentery, unattended with fever, which he describes in his *commentarius de dysenteria*, a *rheumatism* of the intestines.

But although it be not denied, that the gout and the rheumatism do sometimes quit their proper station, and attack the stomach and intestines ; yet experience by no means testifies, that palsy is the ordinary consequence of such an attack. A pain in the bowels, arising from a gouty cause, under proper management, generally

returns to the extremities ; which are very apt, for some time afterwards, to be swollen, and weakened. But a paralytic affection is not the usual termination of an arthritic colic. That *paralysis*, to which gouty people are subject, as far as I have observed, attacks them in form of an *hemiplegia*, a disease very unlike that, which is the subject of our present consideration, in many particulars.

Our author gives, under this head, an account of a whole family, consisting of five persons, who were all first seized with arthritic pains, and then with a colic, which was suc-

ceeded by a palsy. Two of this number died. There is a circumstance in this history, which appears extraordinary. A lady is said to have been affected with all the symptoms above-mentioned, by the means of having slept in the same bed with her sick husband. And we are informed, that there have been many instances of this malady's having been communicated from the husband to the wife, and from the wife to the husband; and that, “*con-
cubare vetant visa.*” But surely, it is much more probable, that five people, living under the same roof, were affected by the same poison, con-

veyed in their food and liquor ; than that the gout, palsy, and colic, were propagated through the family by contagion. For what reason can be given, why contagion was to be supposed to have prevailed in the present case, rather than in the case of the eleven persons, of the same family, mentioned in page 67, whom the author represents as miserably tormented by the colic of Poitou, from one common cause, which he satisfactorily explains ? We are there informed, that all the eleven patients, “ *mutato tecto, renovata aqua, convaluere.*”

Obstructed perspiration is the

fifth of the remote causes, to which this disease is referred.

Ever since Sanctorius published his statical experiments, the importance of the fluid, secreted from the external surface of the human body, has been by writers most strenuously insisted on ; as if health, or its contrary, were the necessary consequence of perspiration properly regulated, or otherwise. The fluid, which nature thus constantly separates from the blood, in greater or in less quantities, has been considered entirely as excrementitious, and necessary to be thrown off ; and any obstruction, given to

it, has been regarded as, in effect, the detention of so much poison in the body. Hence there is scarcely a disease known, which, at one time or other, has not been attributed to this cause. Whether the colic of Poitou can justly be referred to it, we shall now examine.

“ It has been proved, that
 “ the rheumatism is one of the
 “ causes of this disease. The
 “ rheumatism is frequently occasioned by obstructed perspiration. It follows therefore that obstructed perspiration is a cause of the colic of Poitou.” The first proposi-

tion not being allowed, the whole force of this reasoning is at once destroyed.

In confirmation of this theory, the case of an healthy man is appealed to, who, having incautiously, and without his usual clothes, exposed himself to the cold of the morning air, was, in consequence thereof, attacked with severe pains in the epigastric region ; and afterwards became paralytic in his hands and feet. The faithful partner of his bed, who had been constant and indefatigable in her attendance on her husband, likewise obstructed her perspiration ; was attacked with the same colic ;

became paralytic ; and died in convulsions. Surely a disease, which thus affected two people in the same house, must have been excited by a less general cause, than what is here supposed.

It seems indeed not improbable, that taking cold may prove an accessory, an occasional cause of this disease ; where a person is otherwise disposed to it. This was the case of the painter mentioned by M. de Haen in his first history (*ratio medendi, p. x.*) “ Noctu, ob vehementem tonitru, lecto exiliens
“ frigori se diu ad fenestram
“ exposuit ; dein obdormivit

“ iterum. Ex somno autem
 “ expergefactus, intolerabilem
 “ percepit, utraque pedis in
 “ planta, ardorem, unaque octa-
 “ vum colicæ suæ paroxys-
 “ mum.” And Citois formerly
 advised his countrymen of Poi-
 tou to avoid the cold and damp
 air of the morning ; not that he
 seemed to regard cold air as the
 primary cause, but only as ac-
 cessory, in cases where there
 was a previous disposition to
 the disease. A French writer
 therefore speaks judiciously
 concerning this subject. “ Tout
 “ ce qu’on pourroit accorder,
 “ c’est que dans ceux, qui por-
 “ tèrent le germe de cette ma-
 “ ladie, la transpiration suppri-

“ mée pourra le faire develop-
 “ per plus promptement qu’il
 “ n’auroit fait, ou bien rendre
 “ la maladie plus grave, qu’elle
 “ n’eut été.”

Physicians, who have writ-
 ten concerning the diseases of
 the West-Indies have generally
 mentioned obstructed perspira-
 tion, as one of the principal
 causes of the dry belly-ach.
 And the learned author of the
 Latin treatise, which we are
 now examining, in this part of
 his work, seems to be convin-
 ced, that the endemial colic of
 Surinam is to be referred to
 that cause. But there is a
 much greater appearance of

probability in the opinion, which this author himself patronized in a former chapter ; namely, that the endemial colic of Surinam is occasioned by the wines of Bourdeaux ; which, being apt to turn sour in a very hot climate, *iniqua conservatur arte*. And the reason alleged in that chapter, why the negroes are not infested by the colic of Surinam, namely, because they drink no wine, is much more like truth, than that, which is assigned in the present chapter ; namely, that the negroes have stronger constitutions than the Europeans. And the author himself adds, that, in colonies, where the

Madeira wines are drunk, instead of the French wines, this colic is not endemial. But, in fact, if it be admitted, that obstructed perspiration is a cause of the colic of Poitou ; no good reason can be given, why that disease is not, in all parts of the world, nearly as common as a catarrh, or a *diarrhœa*.

The sixth supposed cause of this colic is *the scurvy*.

Willis justly remarks, that the scurvy, like a condemned and infamous name, has had the scandal of most mischiefs charged to its account. And it is well observed by Hoffman, that

when physicians are not acquainted with the real cause of a disease, they are very apt to accuse the scorbutic acrimony of the juices, and to hold out this cause, as a cover for their ignorance. Upon this principle, as I conceive, the colic of Poitou has, in common with many other distempers, been supposed to be of scorbutic origin.

The Dutch seem to have corrupted the original word *schorbeck*, which signifies, in the Danish language, a disease of the mouth, into *scheurbuyk*, a word denoting pains in the belly. The former name very

well expresses one of the most essential and pathognomonic signs of the scurvy. The latter does not appear to have been properly applied to it.

For the truth of an observation, that a colic, ending in palsy, is a symptom of the scurvy, our author appeals to the opinion and testimony of Eúgalenus ; who enumerating no fewer than forty-nine scorbutic symptoms, adds this species of colic to his immense catalogue. But, in order to determine, what degree of deference is due to the authority of Eugalenus, we ought to reflect, that it was the

favourite opinion of that author, on which he frequently pays compliments to his own sagacity, that the scurvy is apt to assume the appearance of almost every known disease, acute as well as chronic. And surely the judgment of a physician is not much to be regarded, who could take a proneness to faint, in lying-in women, for a symptom of the scurvy ; and who could determine the mortification in the foot, of a man of seventy years to be scorbutic, from the black and purple spots, which appeared on the mortified part ; and from the small, weak, unequal pulse of the patient. (*See Lind's treatise on the scurvy, page 29.*)

Nor is this fact established, although we find the same observation repeated by subsequent writers. For as it has been abundantly shewn by the ingenious Dr. Lind, all succeeding writers, for a considerable time after Eugalenus, follow him religiously and minutely in their description of this disease.

That scorbutic patients may sometimes suffer pains in their bowels, as well as in other parts of the body, is not controverted. Nor do we contend, that even the colic of Poitou is incompatible with the scurvy. But those authors, who have

been most conversant with the scurvy, and who have given the most faithful and accurate description of it, do by no means testify, that a colic, terminating in palsy, is the ordinary effect of that disease, in long voyages.

Dr. Lind instructs us, that the *scorbutica paralysis* generally comes on, without any preceding colic, in the second stage of the disease ; and that it arises from a contraction of the flexor tendons of the ham ; and is attended with a swelling and pain in the knee. Besides, the loss of motion, to which scorbutic patients are subject, dif-

fers in several particulars, from the palsy, which succeeds the colic of Poitou. This, for the most part, affects the upper extremities ; that the lower. Then, it is observable, that scorbutic patients, although they may want strength to walk, or even to stand ; yet, when in a recumbent posture, have still a power of moving their limbs. Likewise, the scorbutic palsy is not so constant and permanent ; but has its changes and intervals, and is apt to make sudden and momentary attacks ; so that a person, who yesterday, could not support the weight of his body, shall to-day with small assis-

tance, be able to walk a little ;
 nay, in the course of a single
 day, the inability to walk shall
 come on, and shall cease, several
 times. This is agreeable to
 what is said by Willis, in his
 treatise *de scorbuto*. “ Affectus
 “ paralytici, scilicet impoten-
 “ tia aut resolutio unius aut
 “ plurium membrorum, item
 “ stupor et formicatio sensus,
 “ scorbuto ingravescenti crebro
 “ superveniunt : cujusmodi ta-
 “ mensymptomata, ut plurimum
 “ non sunt valde fixa et perma-
 “ nentia ; verum modo cessant
 “ et remittunt, modo repetunt
 “ et intenduntur :” Nor will
 there appear to be any weight
 in an observation, that, “ in a

“ scorbutic palsy, when arising
 “ from a muriatic cause, the
 “ limbs of a patient will be-
 “ come rigid ; when arising
 “ from an acid or alkaline
 “ cause, flaccid and pendu-
 “ lous ;” since Sir John Pringle
 seems very judiciously to have
 excluded the muriatic, the acid,
 and the alkaline causes ; and
 properly to have considered
 the scurvy as one, simple, uni-
 form disease, arising only from
 putrefaction.

The seventh supposed cause,
 mentioned in this treatise, is
melancholia.

The ancients, having given

to the liver the office of sanguification, from a mixture of the four principal humours, supposed the redundance of the yellow bile to be carried into the gall-bladder, and what remained of the black bile to flow through the *vena splenica* into the spleen, as its receptacle. And to this black bile the source of many disorders was referred. In the barbarous and very imperfect state of the ancient physiology, we cannot be surprised that such a doctrine was established among physicians. But it is wonderful to find some of the moderns, at the same time that they cannot but know the foundation of such a theory to

be false, through an ill-placed veneration for antiquity, not only retaining the terms *black bile*, and *atrabiliary humour* ; but vainly torturing their imagination, in order to explain principles, in themselves most inconsistent and incomprehensible ; to reduce into system and method *quæ in se neque consilium neque modum habent ullum*. In no part of his works is Boerhaave at greater pains to reconcile the ancient to the modern physiology ; and in no part of his works does he give his reader less satisfaction.*

* A few years ago I was consulted by a gentleman who had taken many medicines

The opinion of the several authors, who are here appealed to will not appear to be of importance, if we consider, how little probability there is in the following theory; namely, “that this black bile, being
“out of its natural course, and
“penetrating the coats of
“the intestines, is transferred
“to the membranes of the *ab-*
“*domen*; and that thus an ob-
“stinate colic is excited, which

with a view to dissolve the *atra bilis*, which was supposed to appear as well in what he vomited, as what he voided by stool. After death, this *atra bilis* was found to be no other than blood from an ulcer at the beginning of the *duodenum*.

“is to be relieved only by
“palsy.”

As to the instances brought to prove that grief has occasioned this colic, by having generated the black bile, they appear very inconclusive. In the first case, no better reason is given for the supposed undoubted presence of the black bile, than because the patient was affected with *urentes incute carbunculi*; and was afterwards cured by the liberal use of the spring-juices, and Spa-water. In the next history, in which a lady, who had suffered great anxiety of mind, is said to have been affected with colic

pains, and to have lost the use of her fingers ; the only argument here brought to shew, that black bile was the cause, is founded upon an observation that a *diarrhœa*, occasioned by the use of saponaceous medicines, and of the fruits of the summer, was the means of her recovery.

There now only remains, to be examined, the last supposed cause of this colic, namely, *the passions of the mind*.

That violent passions of the mind are capable of exciting various disturbances in the human machine, is a fact, which

can admit of no doubt. We sometimes, however, meet with histories of diseases supposed to be thus occasioned, which histories seem to border on the marvellous, and almost surpass credibility ; so that we cannot help suspecting that the case has been imperfectly stated ; and that some circumstances have been omitted, which, if fairly represented, would set the whole fact in a different light. We have heard of instances of the small-pox having been occasioned by a fright, when there has been no possibility of contagion ; and the most terrible effects of the bite of a mad animal have been said to

have been excited by the mere passion of anger. If such histories are admitted as authentic, we can have no pretence to doubt, that anger, or sorrow, or a sudden fright, may have been the immediate cause of a disease similar to the colic of Poitou. But still, it will be granted, that these are very extraordinary effects of the passions : such as have not, I believe, been observed by many physicians, even of the most extensive practice.

It is affirmed, that this species of colic often occurs in hysterical women, and sometimes in hypochondriacal men, of an

irritable system of nerves. We may admit this to be a fact ; and yet it will not follow, that the hysterical and hypochondriacal disease ought to be otherwise considered, than as the predisposing cause. Persons, of a delicate habit of nerves, may perhaps be particularly susceptible of impressions, made on the body by certain poisons ; but it would be highly unphilosophical to infer, that the poisonous influence resides in a disposition of body, favourable to its reception. The painter, mentioned in M. de Haen's first history, after a violent fit of anger, is said to have suffered convul-

sions, which were succeeded by a return of his colic. In this case, the poison, which had a long time been admitted into the constitution, in consequence of his daily employment, was, by the passion of anger, immediately brought into action; but by no means created by the passion of anger. It was formerly observed by Citois, that the inhabitants of the province of Poitou, who had suffered anxiety of mind on account of any misfortune to themselves, or families, were particularly subject to this colic. The general cause of it had been principally attributed to the sour wine of the coun-

try ; and the passion of grief may easily be supposed to have rendered the body more susceptible of injuries from the endemial poison.

Sydenham, who, in his epistolary dissertation, addressed to Dr. Cole, is very copious concerning the universal influence of the hysteric disease on every part of the body ; and who gives a particular description of the hysterical and hypochondriacal colic ; informs us, that jaundice, and not palsy, is the natural termination of that disease. Whenever therefore this species of colic does happen in hysterical habits, may it not

fairly be considered, rather as the effect of a latent cause, taking advantage, as it were, of such a constitution, than as the offspring of an original disease?

Thus have I examined the several supposed causes of the colic of Poitou, with a view to ascertain its real and specific origin. It may be observed, that there are in nature various substances, as well medicinal as poisonous, which have properties peculiar to themselves; and which are distinguished from other substances by the constant and uniform changes, which they, and they only, pro-

duce in the human body. It is the peculiar operation of lead to excite a disease, most remarkably characterized. I do not venture to affirm that there does not exist another cause productive of similar effects ; but from what has above been written, it may perhaps appear, that such a supposition is not void of probability ; since no other cause has hitherto been shewn to be adequate to the *phænomena*.

V. *An Appendix to an Inquiry concerning the Cause of the Endemial Colic of Devonshire.*

Read at the COLLEGE, August 11, 1767.

SINCE an *Inquiry concerning the cause of the endemial Colic of Devonshire* has been printed, I have received several articles of important intelligence on that subject; which are here subjoined.

Dr. Ingen-housz, not being entirely satisfied with the information, which he received, when he was at Rouen, has inquired of a physician of that

What immediately follows, is an extract of a letter which I received from Dr. Wall of Worcester, to whom I was formerly obliged for some important remarks, when I first began this enquiry.

“ I here transmit to you
 “ some facts, which may serve
 “ to confirm your doctrine, that
 “ *the poison of lead may gain ad-*
 “ *mittance into the human body,*
 “ *unobserved and unsuspected.*
 “ A gentleman of this town
 “ was the father of a numerous
 “ offspring, having had one and
 “ twenty children, of whom
 “ eight died young, and thir-

“ teen survived their parents.
“ During their infancy, and in-
“ deed until they had quitted
“ the place of their usual resi-
“ dence, they were all remark-
“ ably unhealthy ; being parti-
“ cularly subject to disorders
“ of the stomach and bowels.
“ The father, during many
“ years, was paralytic ; the
“ mother, for as long a time,
“ subject to colics, and bilious
“ obstructions. She died at
“ last of an obstinate jaundice.
“ This disease had been seve-
“ ral times removed by the use
“ of the Bath-water ; but it al-
“ ways came on again soon
“ after her return to Worces-

“ ter ; and at last eluded every
“ method and medicine which
“ was tried.

“ After the death of the pa-
“ rents, the family sold the
“ house which they had so
“ long inhabited. The pur-
“ chaser found it necessary to
“ repair the pump. This was
“ made of lead : which, upon
“ examination, was found to be
“ so corroded, that several per-
“ forations were observed in
“ the cylinder, in which the
“ bucket plays ; and the cis-
“ tern in the upper part was
“ reduced to the thinness of
“ common brown paper, and
“ was full of holes, like a sieve.

“ The waters of this town are
 “ remarkably hard. They cur-
 “ dle soap ; coagulate milk ;
 “ let fall a large precipitate
 “ upon the addition of an alkali,
 “ either fixed or volatile ;
 “ and, in dry seasons, taste
 “ bitter and aluminose. They
 “ consequently contain a calca-
 “ rious earth dissolved by an
 “ acid which appears to be of
 “ the vitriolic kind. Though
 “ such an impregnation may
 “ not make water a perfect
 “ menstruum of lead, yet it cer-
 “ tainly may make it capable of
 “ corroding that metal ; and
 “ therefore the caution of Ga-
 “ len and Vitruvius, with res-
 “ pect to the use of leaden

“ pipes, for the purpose of con-
“ veying water, as cited by you,
“ appears to be well founded,
“ for the reason which you
“ have assigned, viz. because so
“ much lead may thus be me-
“ chanically mixed with, and
“ suspended in water, as to
“ communicate to it noxious
“ qualities. The foregoing ac-
“ count fully confirms the truth
“ of your observations; and
“ indeed it is more than proba-
“ ble, that the water of this
“ pump, thus mixed with lead,
“ did occasion the unhealthi-
“ ness of the family who drank
“ of it. Since I wrote what is
“ above, I have been informed
“ by the plumber employed by

“ that family, that he had seve-
 “ ral times repaired the pump ;
 “ and particularly that he had
 “ done so not more than three
 “ or four years before the gen-
 “ tleman’s death ; and that he
 “ then found it nearly in the
 “ same state as it has been de-
 “ scribed ; so that the corrosion
 “ was effected in a short time ;
 “ and consequently the water
 “ must have been very strongly
 “ impregnated with the noxi-
 “ ous qualities of the metal.

“ In a former letter, from
 “ which you made some ex-
 “ tracts, I mentioned the case
 “ of a woman, who was afflic-
 “ ted with the usual symptoms

“ of the colic of Poitou, occa-
 “ sioned by drinking cyder
 “ which had been made at a
 “ press, the bottom of which
 “ was covered with lead. Since
 “ that, I have had two more
 “ patients from the same vil-
 “ lage, who were affected in
 “ the same manner, and from
 “ the same cause. One of these
 “ was a farmer, in good circum-
 “ stances, who had had fre-
 “ quent returns of the dry-
 “ gripes, which at last left him
 “ with a tremor in his hands,
 “ and great weakness in his
 “ wrists. As he was igno-
 “ rant of the true cause of
 “ his complaints, he had
 “ drunk his cyder at inter-

“ vals, during his whole ill-
“ ness, until I acquainted him
“ of the dangerous tendency of
“ it. He then recollected that
“ the pains in his bowels had
“ constantly used to come on,
“ after he had made a more free
“ use than ordinary of that li-
“ quor. The other was my
“ patient in the Worcester In-
“ firmary. When he was ad-
“ mitted into the house, he had
“ great pain and constipation
“ in his bowels ; his wrists
“ were paralytic ; and the back
“ of his hands much swoln.
“ He told me, that, for several
“ years, he had usually been
“ afflicted with the dry gripes
“ in the spring, viz. about the

“ time when the cyder, made
“ in the preceding autumn,
“ began to be tolerably fine,
“ and fit for use. That season
“ had been remarkably wet ;
“ so that the apples had not
“ ripened well, but the juices
“ of them were crude and im-
“ mature. The cyder there-
“ fore was more austere and
“ acescent than common ; and
“ on that account must have
“ acted more powerfully on the
“ metal, than it usually had
“ done in more seasonable
“ years ; and for that reason
“ the liquor had now had a
“ more violent and permanent
“ effect on him than formerly.”

“ I am inclined to think, that
“ cyder, made in mills or pres-
“ ses, in which lead is used, is
“ more or less noxious in pro-
“ portion to its age. It seems
“ probable, that part of the me-
“ tal may sink down with the
“ lees, especially where it is
“ only corroded or mechani-
“ cally mixed with the liquor ;
“ and therefore that the cyder,
“ which is of a considerable
“ age, and especially such as
“ has been frequently racked off
“ from the sediment, may be in
“ a great measure freed from its
“ poison. In some/ parts of
“ Gloucestershire, especially
“ where the clothing manu-
“ factures are carried on, the

“ cyder-presses are usually co-
 “ vered with lead ; and I have
 “ been informed by some per-
 “ sons of undoubted credit, that
 “ if their workmen drink their
 “ cyder whilst it is new, before
 “ it is well cleared, and has
 “ thrown down its sediment,
 “ which they are very apt to
 “ do, most of them are affected
 “ with pain in their bowels,
 “ and weakness in their wrists ;
 “ but that, if they do not drink it
 “ until it is of proper age, they
 “ escape better, and seldom ex-
 “ perience such effects.*

* Hence probably it happens, that such
 patients are sometimes found in the Bath
 hospital, from the county of Gloucester,

“ I should sooner have
 “ transmitted this paper to you,
 “ but that I have waited to have
 “ the effects of the saturnine
 “ applications, so much recom-
 “ mended by M. Goulard, as-
 “ certained. Upon very fre-
 “ quent trials, our surgeons

and rarely any from that of Hereford or
 Worcester. “ All such paralytics,” says Dr.
 Charleton, “ come to our hospital from the
 “ counties of Devon, Somerset, Gloucester,
 “ and Cornwall. It is a very remarkable
 “ fact, that during the thirteen years to
 “ which this enquiry extends, there has been
 “ only one such patient sent us from Here-
 “ fordshire and not one from Worcester-
 “ shire.”

See *An enquiry into the efficacy of warm
 bathing in palsies*, by R. Charleton, M. D.
Physician to the General Hospital at Bath,
 page 81.

“ have found, that the *acetum li-*
 “ *thargyrites* or *extrait de sa-*
 “ *turne*, as M. Goulard calls it,
 “ does really deserve, in a great
 “ degree, the character which
 “ he has given of it. They
 “ have applied it, with consi-
 “ derable success, to inflamma-
 “ tory and indurated tumors,
 “ even in some cases which
 “ had resisted every other me-
 “ thod. It has been particu-
 “ larly beneficial in the *hernia*
 “ *humoralis*, and in some putrid
 “ ulcers ; but in the latter case
 “ it does not produce its effects
 “ so certainly ; sometimes do-
 “ ing nothing and sometimes
 “ seeming to affect the bowels.
 “ In general, it is found to

“ allay inflammations very spe-
 “ dily. In such instances does
 “ it not seem to produce its ef-
 “ fects by destroying the ner-
 “ vous influence, and so taking
 “ off the spasm and irritation
 “ rather than by any resolving
 “ power, as M. Goulard suppo-
 “ ses? In recent strains, contu-
 “ sions, fractures, &c. M. Gou-
 “ lard’s application, together
 “ with a small proportion of
 “ spirit of wine, is found to be
 “ of excellent use; and to
 “ abate the swelling, and take
 “ off the tension, sooner than
 “ *spiritus Mindereri*, or any
 “ other of the common external
 “ applications.

“ Worcester, May 30, 1770.”

By the favour of Dr. Ad-
dington, I have received from
Dr. Hemming, of Crookhern,
in the county of Somerset, an
account of the following fact.
“ A farmer in the year 1768,
“ when great quantities of cy-
“ der were made in these parts,
“ bought a wooden cistern,
“ which contained about four-
“ teen hogsheads, and lined the
“ inside with sheet-lead, to the
“ amount of six or seven hun-
“ dred pounds weight. Into
“ this vessel, he poured his
“ newly-made cyder ; where it
“ remained near a month, and
“ in that time underwent seve-
“ ral fermentations. The far-
“ mer, not apprehending that

“ any bad consequence would
 “ attend it, drank of this cyder
 “ himself, as did his family.
 “ Several hogsheads of it were
 “ likewise sold. All, who
 “ drank this liquor, were sei-
 “ zed with violent spasms in
 “ their stomach ; bilious vo-
 “ mitings ; a great tension
 “ about the *abdomen* ; and ob-
 “ stinate costiveness. The far-
 “ mer, and some others, lost
 “ the use of their hands.

“ Crookhern, Jan. 24, 1770.”

I am in possession of vari-
 ous other attestations, serving
 to prove, that lead, whenever
 it is suffered to come in contact
 with cyder, does very speedily

communicate to that liquor a poisonous quality ; and likewise that, in several parts of this country, our cyder has actually had all those opportunities of being affected by the poison of lead, which have been particularly pointed out in my former papers on this subject. I selected the testimony of Dr. Hemming from a great number of similar testimonies, because it came from a physician of credit, who speaks of this accident from his own knowledge ; who attended several of the persons affected ; and who cannot be supposed to have been deceived with respect to the cause of the malady,

or those effects of which he was an eye-witness. Before I quit this subject entirely, let me not forget to mention, that I learn from unquestionable authority, that the practice of suspending a large ball of lead in the weak, sour cyder, (such as usually comes to the share of poor labourers, who are particularly subject to the dry-gripes from the use of cyder) has been much more common than I formerly apprehended.*

There is likewise another very mischievous practice pre-

* This practice is mentioned by Dr. Charleton, in his treatise referred to above.

vailing in several counties, which ought not to pass unnoticed in this place ; I mean that of drinking cyder out of earthen vessels glazed. Dr. Watson, junior, when he was lately at Exmouth, saw several instances of the Devonshire colic, during the time of harvest, apparently from this cause. And a similar instance, not long since, fell under Dr. Charleton's knowledge, of six persons, who became at the same time paralytic, by drinking cyder, brought to them, while at harvest-work, in a new earthen pitcher, the inside of which was glazed. That the glazing was dissolved by the liquor,

appeared not only by the effects, which the drinking of it produced, but likewise from its having given (as these persons informed Dr. Charleton) that astringent sweetish taste to the liquor, by which the solutions of this mineral are peculiarly distinguished.*

An inquiry† concerning the

* See Charleton's Enquiry, &c. p. 80.

† In an Essay on this subject, *Med. Trans. vol. i. p. 181*, I cited a passage from the preface to a French pamphlet, written by an anonymous author, wherein there is an intimation, seeming, in some measure, to correspond with the idea which had appeared to me to be more than probable. But I added, that it seemed evident from what the same writer said afterwards

true cause of the Devonshire colic, naturally led me to the

in the same pamphlet, that he was very far from having formed any decisive opinion concerning the cause of the colic of Poitou.

In a note, added to a late edition of this pamphlet, I find the following words :
 “ Voilà donc mes soupçons éclaircis, et
 “ pleinement justifiés par ces observations.
 “ M. Baker a démontré en 1767 le fait que
 “ je n’avois fait que conjecturer en 1757 :
 “ ainsi je lui dois des remercimens d’avoir
 “ donné la preuve de ce que j’avois ima-
 “ giné. Mais qu’il ne dispute pas à ma
 “ conjecture le droit de dix ans d’aisné-
 “ qu’elle a sur la sienne ! Je serois assez
 “ content, si je pouvois me flatter (ce qui
 “ n’est pas absolument sans fondement) de
 “ l’avoir mis sur la voie, et de lui avoir fait
 “ naître l’idée des recherches qu’il lui a été
 “ très facile de faire. J’espere qu’en faveur
 “ des raisons que j’allégué, il voudra bien
 “ dorenavant me pardonner de n’avoir pas

consideration of a similar disease, which has been endemial

“ affirmé positivement un fait dont la démon-
 “ stration me manquoit, et qu’il m’a
 “ fournie.”

I am desirous to pay all due honour to this learned and acute physician ; but in the present case, I cannot acknowledge the justice of his pretensions. It might easily be proved, that my paper had some time been prepared for the press, before I ever saw the pamphlet in question, or any part of it ; and that what I cited from it was added by interpolation. But the truth of what is here said, will hardly be doubted by those who know, that this very lively piece of criticism, written *by a physician of Paris*, in its first edition, was never allowed to appear openly at Paris. The gentleman, to whom I was obliged for the perusal of it, informed me, that he procured it in that city not without great difficulty, and as a mark of particular favour. In London, it has hitherto been generally unknown, as

in the West-Indies. And, having had frequent opportuni-

well in public and private libraries, as in the shops of booksellers.

Having again read over this pamphlet, I have found no reason to alter my original sentiment: I must therefore demur to the claim of *prior occupancy*; and I am apt to think, that an unprejudiced reader, who shall have leisure and inclination to consider the general tendency of this author's preface, and to compare it with what follows in the course of the pamphlet, will agree with me in opinion, that what was cited from the former part seems rather to have been thrown out accidentally, and in the heat of disputation, than to have been delivered as a conjecture, which the author himself then thought probable.

Comparing the two editions of this pamphlet, I find a remarkable variation in one passage. In the first edition, p. 46, our author, having rejected five of the eight supposed causes of the colic of Poitou, pro-

ties of bringing this subject to a more strict examination, I

ceeds thus : “ Il ne me reste à parler que de
 “ la méthode curative, qui regarde les trois
 “ premières causes, sçavoir la bile, les ma-
 “ tières minérales venimeuses, et les vins
 “ verds et austères : or ces trois causes (si
 “ tant est qu’il n’en faille pas retrancher
 “ encore la première) *quoique différentes*
 “ *en apparence*, produisent, malgré ce qu’en
 “ peut dire M. Tronchin, des coliques à
 “ *peu près* de même espèce, et qui se gué-
 “ rissent par une même méthode, dont on
 “ ne doit s’écarter, que relativement à de
 “ légères circonstances. Voions cepen-
 “ dant quels sont les remèdes, qu’il con-
 “ seille pour ses trois espèces de colique.”

In the second edition, p. 38, the latter part of this quotation is thus changed :
 “ Or, de ces trois causes (si tant est qu’il
 “ n’en faille pas retrancher encore la pre-
 “ mière *et la dernière*) il ne resulta jamais,
 “ malgré ce qu’en peut dire M. Tronchin,

am still farther convinced, that the dry belly-ache of those islands is neither to be considered as a disease, which the inhabitants owe to their climate, as some have supposed ;

“ que des coliques de même espèce, et qui se guérissent par une même méthode. Voions cependant quels sont les remèdes qu’il conseille pour ses trois *prétendues* espèces de colique.”

From hence it manifestly appears, that in the year 1758, this author had really conceived some doubts, whether *the bile* ought or ought not to be regarded as a possible cause of the colic of Poitou. But from hence it does by no means appear, that he had conceived the same doubts, with respect to *sour and austere wines*, until the year 1767. But let me not engage further in a controversy, so entirely uninteresting, and so unimportant !

nor, according to the opinion of others, as a disease produced by the inordinate use of the acid juices of certain vegetables. The truth is that while our colonists in the West-Indies made their punch with newly distilled spirit, and drank it very strong and very sweet, they were perpetually subject to the colic ; but that, having now learned to keep their rum to a proper age, and to drink their punch much weaker than formerly, and extremely sour, they in great measure escape that disease. I have heard it observed, that the servants, who drink the new rum by stealth, are particularly subject

to this disease. It is likewise certain, that experience has now taught the West-Indians, that the juice of lemons and limes is so far from being the cause of this colic, that they frequently find in it a most efficacious remedy against its severest attacks. This observation was formerly mentioned ; and it is now repeated upon the best authority. My suspicion that lead, which enters the composition of the apparatus for distillation, is the principal cause of this malady in the West-Indies, has already been communicated. But, upon farther enquiry, I discover, in several of those

islands, more traces of that metal, employed in the preparation of rum and sugar, than I was formerly aware of. For first, the juice of the canes, being expressed by a mill, flows into a vessel lined with lead. From thence it is conveyed to the boiling house through leaden gutters. Likewise the skimmings, which are taken off the liquor during its decoction, as well as the melasses, are conveyed to the still-house through leaden gutters.

Much has already been said concerning the metallic mixture, which in general is used

for lining copper vessels, designed for the kitchen, in which composition lead bears the proportion of ten to sixteen of tin. As I have lately been instructed, the danger of this mixture does not arise merely from the probability that the saturnine part of it may be corroded by the acid juices of vegetables. It is very well known, that vessels, thus lined, frequently want repairing. The metallic mixture adheres to the copper by a very loose connexion. Strong fire speedily disunites it ; and it falls off in form of powder. And this appears particularly to be dreaded in the preparation of

food *à la braise*, as the French term it, in which process fire is placed upon the cover, as well as applied to the bottom of the vessel.

Let me here take occasion to mention the common wine-measures ; which in this country, as well as abroad, are made of a base kind of pewter, wherein there enters a large quantity of lead. M. Roux, author of *Le Journal de Médecine*, when he was lately in this town, favoured me with the following observation on this subject : “ Le vin, qui est destiné au peuple de Paris, est ordinairement verd et foible,

“ et par conséquent très dispo-
“ sé à l'acescence. Cela va au
“ point qu'en été, lorsque le
“ tems est un peu chaud, une
“ demie heure suffit pour le
“ changer en vinaigre, s'il a le
“ contact de l'air. Les mar-
“ chands, qui le vendent, lui
“ connoissants cette qualité, ne
“ le distribuent jamais à ceux,
“ qui vont boir chez eux, que
“ dans des vaisseaux d'étain,
“ dans l'alliage desquels il en-
“ tre une très grande propor-
“ tion de plomb. Il est bien
“ évident, que le plomb ne
“ peut empêcher ce vin de
“ s'aigrir, que parce que l'acide,
“ à mesure qu'il se developpe,
“ l'attaque, se neutralise, et par

“ là est mis hors d'état de re-
 “ agir sur le vin, et d'en accé-
 “ lérer la décomposition ; ce
 “ qui arrive en effet, lorsqu'on
 “ le tient dans des vaisseaux
 “ de terre, de verre, ou de bois,
 “ s'ils ne sont pas bien bou-
 “ chés.”

The celebrated M. Rousseau*
 attributes the frequency of the
 colic of Poitou, among the com-
 mon people of Paris, to the use
 of poor sour wines, which have
 been suffered to flow over a
 surface of lead. The follow-

* *Emile, ou de l'Education*, par Jean
 Jacques Rousseau, tome premier, seconde
 partie, page 34.

ing is the passage alluded to :
 “ Les vins, qu’on vend en dé-
 “ tail chez les marchands de
 “ vin de Paris, quoiqu’ils ne
 “ sont pas tous lithargirés, sont
 “ rarement exempt de plomb ;
 “ parce que les comptoirs de
 “ ces marchands sont garnis de
 “ ce métal, et que le vin, qui
 “ se repand dans la mesure, en
 “ passant et séjournant sur ce
 “ plomb, en dissout toujours
 “ quelque partie.*” M. Roux

* This practice is mentioned by an anonymous French writer ; but he is of opinion, that the colic is but very rarely produced by it, because very small quantities of lead can be dissolved by such means.
 “ Les égouttures du vin, que débitent nos
 “ cabarétiers, reçues dans leur comptoir, qui

confirmed this observation, informing me, that the table called *the counter*, on which the wine is measured at Paris, is covered with lead ; that this table receives the liquor which is spilt in measuring, having for

“est une esèpce de cuvette garnie de
 “plomb, s’aigrissent assez facilement, sur-
 “tout en été, mais dissolvent si peu de ce
 “métal, que très rarement elles donnent la
 “colique.” *Examen d’un livre qui a pour*
titre T. Tronchin de colica Pictonum, par
un Médecin de Paris, p. 27. I shall here
 only observe, what is confirmed by experi-
 ence, that, if any part of the metal be dis-
 solved in sour wine, the noxious effects of
 such liquor cannot be absolutely ascertained.
 They will be relative to the peculiar con-
 stitution of those who shall happen to drink
 it. In some they will be greater ; in some
 less ; and perhaps in others, none at all.

that purpose an hole in it, through which the liquor is conducted into a vessel placed underneath. The fact therefore being as M. Rousseau has stated it, the justice of his animadversion cannot reasonably be doubted ; and since it appears that the colic of Poitou is much more frequent at Paris* than at London, its greater frequency there ought perhaps to be referred to this, as one of the principal causes of it. M. Dubois, who was more than twenty years physician to an

* It is computed by M. Gardane, that at Paris between five and six hundred persons have this disease every year.

hospital at Paris, called *la Charité*, and had therefore great opportunities of investigating and ascertaining the true cause of this species of colic, speaks of it vaguely, and without any precision ; for, according to his notion, the same morbid effects may be produced by every noxious mineral and metal, almost without exception.

M. Gardane,* in his *recherches sur la colique métallique*, published at Paris, in the year

* Censeur Royal, Docteur Regent de la Faculté de Médecine de Paris, Médecin de Montpellier, de la Société Royale des Sciences de cette même ville, et de celle de Nancy.

1768, has by the means of the same hospital thrown a very different light on the subject. Beginning from the year 1755, inclusive, he has published an extract from the register of that hospital, down to the end of July, 1767. Here we find, regularly noted, the trade and employment of each patient, who was admitted within the period above-mentioned. The number is large ; and it is observable, that painters, plumbers, and potters, make up a very great proportion of it. On a nearer examination of the other trades there mentioned, we generally discover, that lead, in some shape or other,

has been more or less concerned. And the remainder of such patients, as seem to have had no dealing with lead in their daily employments, may, as it is observed by M. Gardane, be reasonably supposed to have contracted the disease by the use of wine, poisoned by a solution of lead.

When I was considering the various unsuspected means by which this poison gains admittance into the human body, a very common, but dangerous practice, ought not to have been passed over without notice : I mean that of painting toys made for the amusement of children.

It is well known, that children are apt to put every thing, especially what gives them pleasure, into their mouths ; and it therefore can hardly be doubted but that the disorders of the stomach and bowels, to which they are particularly subject, are multiplied by this practice ; a practice, which lies the more open to censure, as it is of no real utility.

Much has already been urged against the use of the preparations of lead, as internal medicines ; and cases have been related, tending to shew the danger of small doses even of the *tinctura saturnina*, a tincture

in which there can be only a very small portion of that metal. The particulars of the following case have fallen under my own observation. A young man, who had a gleet in consequence of venereal contagion, had been advised to take, twice every day, fifteen drops of *tinctura saturnina*, and to use an *injection*, in which was a solution of *saccharum saturni*. By these means the disorder was cured ; but it was immediately succeeded by a dejection of spirits, restlessness, flying pains in the breast and arms, and a very uneasy sensation round the margins of the feet. Then followed costiveness, colic,

jaundice, and strangury. *Cre-mor tartari*, the common remedy in this case among the miners in Derbyshire, was tried, and with success. Of this medicine he generally took ten drachms every day ; and after six weeks, was entirely freed from his complaints. Having an opportunity of examining the phial, from whence the *tinctura saturnina*, which had been given to this patient, had been taken, I found in it a very large quantity of precipitated matter ; so that it should seem that a part of the metal had been deposited ; and that it could only be an extremely

small quantity of it that had occasioned so much mischief. This history abundantly confirms the truth of what was before observed of the unsafe application of saturnine preparations to the purposes of internal medicine ; since, in certain constitutions, very inconsiderable quantities of them are capable of acting as poisons ; and since physicians have no lights by which they can come at the knowledge, in what constitutions (if such there are) they may be administered with security ; and where their power of doing harm is particularly formidable. How far the solu-

tion of *saccharum saturni*,* used in the *injection*, as before-mentioned, ought to be considered as having contributed to the mischief, I must leave undetermined. But I cannot help observing in this place, that it is greatly to be wished, that all the *injections*, commonly ordered for disorders of the *urethra*, were gone into disuse ; since almost every day's experience testifies that such injudicious applications are, in the event,

* Dr. Charleton, in the treatise above referred to, mentions an instance of a palsy of both legs and arms, occasioned, in the opinion of a surgeon of great eminence, by an attempt to destroy venereal *verrucae* by rubbing them with *saccharum saturni*.

frequently the parent of obstinate and incurable obstructions of that passage. These indeed are not immediate effects of this compendious method of cure ; and it is on that account that they are the less regarded ; but they are too apt to appear towards the latter end of life, and to become a cruel aggravation to the miseries incidental to old age.

Since an English translation of M. Goulard's treatise has been published, a certain preparation of lead, strongly recommended by that author, has been brought into general use. This, in skilful hands, has

proved an efficacious medicine, particularly in those cases, which are above specified by Dr. Wall. But, as it is now received into private families, and is used as a domestic remedy by unexperienced persons (whose confidence in every new-fashioned medicine generally keeps pace with their ignorance) there seems to be abundant reason to fear, that the too much celebrated *extract of saturn* does frequent mischief through misapplication. It is admitted, that it powerfully abates inflammation. But, can every external inflammation be abated with security? It checks cutaneous discharges. But are

not some such discharges salutary? The truth of this reasoning has unfortunately been proved by facts. The gout, thus repelled, has been converted into a paralytic affection ; and an humour on the skin, thus unseasonably suppressed, has been followed by various mischief. These indeed are objections to the external use of lead, in common with all other cold and astringent applications. I am, however, convinced, that this metal, even outwardly applied, has, in some instances, produced its specific morbid effects ; and Dr. Hawley has favoured me with an account of the following curious

fact, which seems to establish the truth of this observation.

“ A gentleman, who had for
“ many years had a fontanel in
“ his thigh, finding that the
“ pea was not sufficiently de-
“ pressed by the usual bandage,
“ for two or three years past,
“ applied occasionally a piece
“ of the thinnest* lead over the
“ oil-skin, which covered the
“ pea. This apparently an-
“ swering the purpose, the oil-
“ skin was by degrees omit-
“ ted ; so that the lead was ge-

* Taken from an Indian tea-chest : in size the piece was not equal to an inch-square.

“ nerally in immediate contact
 “ with the pea and the orifice
 “ of the fontanel. This was
 “ the case about the end of
 “ June 1771 ; when an unea-
 “ siness and oppression were
 “ felt at the *præcordia* and dia-
 “ phragm, with anxiety and
 “ difficulty on making a deep
 “ inspiration. (This complaint,
 “ it is supposed, much resem-
 “ bled that which is not uncom-
 “ monly called by hospital pa-
 “ tients, *a pain at the heart.*)
 “ The disorder, daily increas-
 “ ing, became, towards the
 “ end of July, so grievous as to
 “ require the serious attention
 “ of the person afflicted. On
 “ recollection, he began to sus-

“pect that his complaints
 “might be owing to the nox-
 “ious quality of the lead,
 “which covered the fontanel.
 “He therefore immediately
 “threw it off ; and from that
 “time, without the use of any
 “medicines, the disorder very
 “soon abated, and in about
 “one month was entirely re-
 “moved ; nor has it in any
 “degree returned.”

That lead, either when dis-
 solved by fire, or corroded by
 an acid, emits poisonous *effluvia*
 is sufficiently shewn by the dis-
 eases incidental to plumbers,
 and painters ; nay even by the
 same effects, which not unfre-

quently happen to those who inhabit houses newly painted. But that a degree of heat, much less than that which is required for melting lead, is capable of detaching such *effluvia* from this metal, is a fact which has not generally been noticed. It was before mentioned, that printers, who imprudently use their *types* while they are hot, are subject to palsy and contraction of the fingers. Upon enquiry, I find the truth of this observation abundantly confirmed. The *types*, after having been used, are washed; and, in order to dry them, they are placed near the fire. An intelligent printer informs me,

that, while they are in this state, an offensive smell, like that of melted lead, arises from them; and that the workmen in general well know the danger of touching them, till they become cold. I have heard of some instances of the colic of Poitou seemingly produced by this cause; and it is observable, that, in M. Gardane's hospital-list, above mentioned, we find many printers.

We have another similar instance of the bad effects of the *effluvia* of lead, in the case of persons employed in *scolloping* glass. Having examined a large manufactory of this kind,

I have received the information which follows. The last polish, given to glass, is done by the means of calcined lead. But there is one part of the process of cutting glass into surfaces of various shapes and angles, which is performed by the attrition of the glass against a thick circular plate of lead, turned with great velocity, from whence a smoke is emitted, which is extremely poisonous. The machine, used in this manufacture, is a complicated one, consisting of many wheels of iron, of wood, of several sorts of stone, and one only of lead. It was remarkable, that the man who sat working at the leaden

wheel, was a poor, pale emaciated, paralytic creature ; whilst all around him seemed to be in good health. It is observed, that many, who are thus employed, become consumptive ; some lose their senses ; but the generality of them are subject to a colic, which usually terminates in a palsy of the hands.*

* The glass-grinders, or those whose business it is to polish mirrors, &c. perform that process by the attrition of heavy weights, cased in wood, and moved by a wooden handle. Although this case be sometimes filled with lead, yet no part of it is acted upon by the glass, or by the hands of the workmen. The common medium of attrition, during the most laborious part of the work, is sand, emery, and rotten-stone. But here likewise the last polish is given to

Dr. Charleton has mentioned the effects of the leaden wheel from the papers of the late Dr. Oliver ; and adds, that there issues from it a blue flame, which smells sulphureous.*

Thus have I attempted to point out some of the most remarkable ways, in which this poison has opportunities of exerting its virulence on the human body. Doubtless, more observations of the same kind

the glass by a *putty* made of calcined lead. Hence it is, that so many of these poor people are found in our hospitals, tortured with the colic of Poitou.

* Charleton's Enquiry, page 93.

might be added ; but enough has been said to shew, how much it is to be lamented, that a metal of such singular convenience, and so easily applicable to various purposes in human life, is not more innocent in its effects on the health of mankind.

The best preservative of those poor people, who are obliged to expose themselves to the action of this poison, is greasy, unctuous food. This is well known to those who work in lead-mines ; and it is a common practice of the most prudent among the painters, to take some fat broth, butter, or oil,

every morning before they begin their daily work. Dr, Cremor, physician at Osterhoüt, a small town near Breda, communicated to me, in the year 1766, the following curious observation : “ Osterhoüt is
 “ the place of residence of a
 “ great number of potters, who
 “ are constantly employed in
 “ glazing earthen vessels. Having practised physic here fifteen years, I never observed
 “ among these men one instance
 “ of the colic of Poitou ; indeed
 “ very rarely any affection of
 “ the bowels. Their exemption
 “ from this malady seems to be
 “ entirely owing to the large
 “ quantities of cheese, butter,

“ and fat bacon, which is their
 “ common food. It is, however
 “ observable, that, though these
 “ poisonous *effluvia* are enerva-
 “ ted with respect to the *primæ*
 “ *viæ*, yet very few of these men
 “ are free from disorders of the
 “ breast; but are subject to
 “ coughs, hoarseness, *asthma*,
 “ and sometimes spitting of
 “ blood.”

This prophylactic method
 having been shewn by experi-
 ence to have been generally
 successful in preventing the co-
 lic, the indication of cure, dur-
 ing the paroxysm, has been,
 in the opinion of some physi-
 cians, to sooth and quiet the

nerves ; to inviscate the offending matter ; and to expel it by gentle and gradual means. Opium therefore, and oil, and the mildest laxatives, are the principal instruments, which they have employed. This method has been strongly opposed by others, particularly some of the French physicians, who contend, that these are not only *levioris armaturæ præsidia*, and insufficient, but even that they are doubly unsafe ; for that first, repeated emollients weaken the intestines, already too weak ; secondly, that, though they were entirely innocent, the use of them would take up some precious time, the right,

or the wrong application of which decides the fate of the patient.

The following is the process of cure which is established in the hospital, called *la Charité* at Paris.

Immediately on the admission of the patient, the following clyster is administered.

R. Infusi foliorum senæ uncias duodecim,
*Electuarii diaphœnici unciam unam,

* Electuarium diaphœnicum
Pharmacopœæ Parisiensis.

R. Pulpæ dactylorum mundatorum, in hydromelite coctorum, per cribrum tractæ,

Vini emetici turbidi uncias quatuor.
 Misce ; fiat enema.

A few hours after this medicine has produced its effect, a

Penidiorum recentium, ana semilibram,
 Amygdalarum dulcium excorticatarum
 uncias tres et semis :

Contusis et permixtis omnibus adde mellis despumati libras duas.

Coquantur paulatim ; dein insperge

Pulverum, Zingiberis

Piperis,

Macis,

Cinnamomi

Foliorum rutæ siccorum,

Seminum dauci cretici,

Fæniculi dulcis ana drachmas duas,

Turpethi, tenuissime triti, uncias quatuor,

Diagrydii unciam unam et semis.

Misce : fiat electuarius secundum artem.

second clister is injected according to this *formula*.

R. Olei nucum,

Vini rubri, singulorum partes æquales.

Misce ; fiat enema, quocum, pro renata,
decoquantur capita papaveris albi quatuor.

On the following day an emetic is given him, in this form and manner. Five grains of *tartarum stibiatum* are dissolved in one pint of warm water. This solution is divided into three equal parts ; one of which is to be taken every quarter of an hour. If, however, the two first doses have produced a sufficient operation, the third is omitted. To facilitate the

effect of this medicine, the patient is ordered to drink plentifully of warm water. At night half a drachm of *theriaca* is prescribed, and a decoction of the sudorific woods, of which he is to drink freely, in order to promote sweating.

On the next day no medicines are given ; but on the subsequent morning, this purgative is prescribed.

R. Infusi foliorum senæ, uncias sex,
 Electuarii diaphœnici,
 Syrupi e spina cervina, singulorum unciam dimidiam.
 Pulveris radicis jalapii, grana quindecim.
 Misce ; fiat potio.

This purgative is repeated once or twice more, always at the interval of some days. The theriaca is always given at night, after the purgative. It is said that it is seldom necessary to repeat the emetic. I am assured by several gentlemen, who have attended this hospital, that the same method is constantly pursued, and almost always with success : and it is confidently affirmed, that those persons, who, at the time of their beginning this process, are not become paralytic or epileptic, are generally secured by it both from palsy and from epilepsy.

Although a less severe treatment than that which has here been described, has sometimes been equally successful ; yet those who are the most conversant with the colic of Poitou, agree, that it requires quick and active purgatives. These are the remedies which are principally employed in our London hospitals. In some cases, however, emetics are given in the beginning with good effects ; sometimes the cure is facilitated by the warm bath, and laxative clysters : sometimes the violence of the pain induces the physician to join opium with purgatives ; but all these are applied only as

occasional assistance ; and are not considered as being always necessary and indispensable. I have several times seen the balsam of Peru, which Sydenham recommends as sufficient in itself to the cure of this species of colic, tried both in an hospital and in private practice ; but its effect has not seemed to answer the character given of it by that author.*

* In the year 1756, I visited two plumbers, who at that time, suffered a most violent attack of this colic. It was, in both cases, remarkable, that large doses of opium (such as two grains of the thebaic extract taken every six hours, for the space of two days) did not appear to give them the least degree of ease : but on the contrary,

Palsy is seldom observed to appear in consequence of the first paroxysm of colic, where the colic has been properly treated. The cure of it is generally attempted by stimulating medicines, both internally and externally applied. When these have been found ineffec-

brought on an intolerable thirst. Various purgatives, in form of pills, were tried, but without success. At last the disease, in both instances, yielded to repeated doses of a solution of *sal catharticus amarus* in simple pepper-mint-water ; which, although at first it was rejected by the stomach, very soon were less disagreeable to it : and at once freed the intestines from constipation and pain. They both were paralytic ; but one of them became likewise delirious and blind, and remained so for some time.

tual, the use of Bath-water has frequently succeeded. Whatever method is followed, a peculiar attention must be paid to the state of the bowels.

There is hardly a disease more formidable than the colic of Poitou in a chronic state. Thus far concerning it, I have learned from experience, that little benefit is to be expected from mere medicines, unless they are assisted by an accurate regimen and diet. At a time when all the muscles of the body are weakened and wasting; and when those organs, which are subservient to the digestion and assimilation of

the aliment, are in a particular state of debility, that food only is proper, which is easily convertible into nourishment. Wine and spices, which the patient is apt to desire, and which may seem to be rationally opposed to such extreme languor, give indeed a temporary comfort ; but, in fact, are injurious ; tending only to harden the food, to promote indigestion, and therefore to impede nutrition. Singular benefit has sometimes been received, in this case from a steady perseverance in a milk diet, together with the long-continued use of the Bath-water.

Here certainly there cannot be room for controversy, whether or not strong evacuants are required. I once in this case saw convulsions immediately follow a mild emetic by ipecacuanha. However, as the bowels are almost always inclined to costiveness, even in the intervals of the paroxysms, it will be necessary to correct this disposition occasionally by some mild, but efficacious laxative ; for otherwise the returns of colic will be apt to be more frequent as well as more severe. The *oleum ricini*, when it does not disagree with the stomach, perfectly answers this intention. During the severity of pain

opium will often be necessary ; which here does not act as a mere palliative, affording only a momentary relief ; but is likewise singularly beneficial as an antispasmodic, assisting the operation of purgatives, and facilitating their passage through the intestinal tube. When it is not in our power to remove the cause of a disease, it is a valuable attainment to be able thus to counteract its effects, and to shorten its paroxysms. For, in truth, when this disease has affected the habit for some time, I have never been so fortunate as to find any method of cure so far successful, as to restore the patient to a better,

than to a tender, infirm, valetudinary condition.

Perhaps the principal cause, why physicians are in general so unsuccessful in their treatment of this disease, is, that they are frequently ignorant by what means the poison is taken into the body. From what has been said on the subject, it may easily be supposed that it may happen, that the cause of the mischief continually accumulated in some imperceptible manner, may render the best remedies ineffectual. Dr. Herberden had a patient, who became paralytic, in consequence of frequent attacks of colic.

How the disease had been excited, it did not immediately appear; but an inquiry being made into all this gentleman's habits, it was discovered that it had long been his custom every day to drink a pint of Lisbon wine. Dr. Heberden, having before had reason to suspect Lisbon wine of being sometimes corrected by lead, desired him to drink no more of that liquor. His advice was complied with; after which the patient was very soon freed from the disorder, of which he has had no return.

The opening morbid bodies after death, if it does not always

assist a physician in his future practice, has its singular use, in as much as it frequently exhibits the genuine effect of a fatal disease. One opportunity only has occurred to me of observing the effects of the colic of Poitou, in its chronic state, on a dead body.

A gentleman, who had long been tormented with this disease, and by degrees had become almost universally paralytic, fell suddenly into convulsions, and died apoplectic. Two days after his death the body was examined. And it was here observed, that the stomach had no morbid appear-

ance. The whole tract of the intestines likewise was sound. They were neither wasted in their coats, nor in any part contracted. The liver was less than common ; and there were a few small concretions in the gall-bladder. The substance of the brain was much softer than ordinary ; and about half an ounce of extravasated blood was found on the anterior lobe of the left side of the *cerebrum*. The muscles, in general, instead of their usual fleshy appearance, were become white, and were wasted in a most remarkable manner.

VI. *Additional Observations concerning the Colic of Poitou.*

Read at the COLLEGE, August 6, 1785.

MUCH has already been written, and many arguments have been urged in support of an opinion, that the solutions and *calces* of lead, as they unquestionably are sufficient to the production of the colic of Poitou, so they possess that power solely and exclusively of all other causes, the existence of which has been imagined:—that this disease, whether it be

called the Painter's colic ; the dry belly-ach of the West-Indies ; the hutten-katze of the Germans, entrapado of the Spaniards ; the bellain of Derbyshire ; or the *morbus colicus Damoniorum*, is the specific operation of one and the same poison ; and that though, in particular cases, it may not be easy to trace the passage of this poison to the stomach, yet from the uniformity observed in nature, it is not unphilosophical to suppose, that effects so similar are not excited by different causes. This opinion must still await the judgment of future observation and enquiry. On the one hand, from the

nature of the subject, it is not reducible to the certainty of demonstration. On the other hand, it does not appear, that its probability has hitherto been lessened either by reasoning or by experiment.

There may be observed, in this disease, certain accidental varieties, resembling those of plants sprung from the same seeds. The different manner, in which different persons are attacked by it, is one of these varieties. Its beginning is sometimes sudden, unsuspected, and at once violent. Sometimes the approach of it is announced by signs of indisposi-

tion gradually advancing, namely by a leucophlegmatic and yellowish complexion ; hebetude of the eyes ; restlessness of mind and body ; loss of sleep and of appetite ; frequent eructation from the stomach ; a slight degree of *nausea* ; sometimes a *diarrhœa*, but more frequently a costive state of the bowels, allowing no *fæces* to pass through them, except in form of small, globular, and hard lumps. These leading symptoms are soon followed by a sense of weight and fulness in the epigastric region, and, successively, by all that train of evils, of which the second volume of Medical Transactions,

page 68, contains a copious and just description.

There is another variety, observable in this species of colic, respecting the external condition of the *abdomen* ; which, in some cases, is so distended and hard, as if it were likely to burst ; and so tender, as to be impatient of the softest covering, or the most gentle touch ; and is, in other cases, drawn back to the spine, nearly deprived of motion, and not only bearing almost any degree of pressure, but even benefitted by it. One of the plumbers (mentioned in the second volume of Medical Transactions, p. 463.)

whom neither purgative medicines, nor opium, nor the warm bath, had at all relieved, enjoyed a considerable alleviation of his torment, whilst, at his request, a very corpulent neighbour was sitting on his belly. This retraction of the *abdomen*, and particularly of the navel, to the spine, has by some physicians been regarded as an essential and pathognomonic symptom of the colic of Poitou;* and it has been said, that, only by applying a

* Those authors, who have divided this disease into *the metallic* and *the vegetable* colic of Poitou, have contended, that *the sudden invasion of pain*, and *the retraction*

hand to the part affected, one may fully determine the nature of the disease. Experience, however, testifies, that both the state of the *abdomen*, just described, and its contrary state, are incidental to the colic of Poytton ; but, that neither the one nor the other can justly be called pathognomonic. What the particular circumstances are, respecting either the disease, or the patient, on which this difference depends, it is not easy to ascertain, and it would be nugatory to conjecture. In

of the belly, are two of the symptoms, by which the former may be distinguished from the latter.

cases of the greatest severity, I believe, the belly will most commonly be found to be drawn back. And sometimes the bowels may be perceived to be contracted in some parts, and dilated in others.

It may likewise be observed, that the symptoms of this malady do not always follow each other in a regular and stated order of succession. Muscular pains, in various parts of the body, have tormented the patient some time previously to the attack on the stomach and bowels. It has likewise happened, that the disease has made its first appearance in a paralytic affection

of the wrists. Convulsions have generally come on, when the pain has ceased ; but they sometimes begin during the violence of it, and sometimes after the appearance of palsy. There likewise have been cases, where the first seizure has been an* epileptic fit. This disease sometimes begins with a temporary *mania*, as may be observed particularly in the manufacturers of cerusse. In many cases, but not universally, when the palsy has commenced, a small tumor is observable on the back of one or both

* See Med, Trans. vol. ii, p 86.

hands, at the extremity of the metacarpal bone of the middle finger, next to the *carpus*, of the size of a small nut, without pain or change of colour, in some moveable, in others fixed. This tumour sometimes disappears gradually, and sometimes continues. Experience has not shewn, either that this tumour is to be considered as critical (which has been suspected), or that it contains a malignant humour, which, if suddenly reabsorbed, is capable of producing a fresh attack of the colic. Certain it is, that no disease is more liable to a relapse, whether this tumour does, or does not, appear.

In some patients the legs have been paralytic for a night ; and some, but not very many cases, have been remarked, in which the palsy of the legs has been lasting. In some, the palsy has been attended with a temporary loss of voice ; the patient being unable to speak otherwise than in a whisper.

A temporary *gutta serena*, and a comatose affection, or a quiet kind of *delirium*, are not very uncommon effects of this disease.

This palsy invariably grows worse after every paroxysm of pain. By it the parts are de-

prived only of motion, the sense of feeling being even quicker and more acute than in a state of health ; and the paralytic parts often suffering great pain. It may be distinguished from the common apoplectic palsy, by this circumstance particularly, that the debility, induced by it, comes on gradually ; and that the limbs, affected by it, are hardly ever entirely deprived of all motion. This palsy sometimes continues through life ; and sometimes, when the parts have suddenly been restored to motion, a fit of colic has been the immediate consequence, allowing but short intervals of ease, until it again

ends in palsy. There is nothing in this case more remarkable, than the atrophy of muscular flesh, with which it is attended, particularly of that which constitutes the ball of the thumb. According to my observation, a patient ought never to think himself secure, against a return of the colic, whilst this singular effect of it continues.

In treating the colic of Poitou (as was formerly* observed), we ought principally to rely on the operation of the more active cathartics, steadily insis-

* Med. Trans. vol. ii. p. 462.

ted on, until the bowels have been thoroughly cleared. But a physician will not probably succeed so soon, or so certainly, in relieving his patient from pain, by any means, as by joining opium with a purgative medicine. In cases, likewise, where such a disposition to vomiting prevails, that nothing is retained in the stomach, opium will be thus administered with a peculiar advantage. It may also be useful to give opium after the operation of a purge, in order to quiet spasms, and to procure sleep. But when it has been given in large doses, before that the bowels have been emptied, instead of allay-

ing the violence of the symptoms, it has, in some cases only added to the distress of the patient. I believe, however, that the opinion of Baglivi, that opium given in this disease, accelerates palsy, is not founded in experience. It must here be remembered, that *the art of physic rarely admits of any perpetual precepts*; and that the best medicine may do harm, if not adapted to the patient, as well as to the disease. The *dura ilia* of men accustomed to hard labour, may bear, and even require, such a method of cure as would be ill suited to the sensibility of an hysterical

woman, or to the tender fibres of an enfeebled West-Indian.

A blister to the *abdomen* has often afforded quick relief in this colic ; and it has been observed, that, very soon after this application, purgative medicines have acted with more certain power.

An effectual emetic given in the beginning of this disease, as it unloads the stomach from its foul contents, is advisable, and even necessary. But a frequent repetition of strong antimonial vomits, given with an intention to evacuate the *cor-*

rupted bile, would only harass, the patient most unprofitably. Those, who, on this principle, have recommended such a practice, have mistaken the effect for the cause. One might, with equal soundness of argument, maintain, that sea-sickness is excited by bile; a cough by a copious expectoration of *mucus*; or an *ophthalmia* by the water that distils from an inflamed eye.

A temporary relief may sometimes be procured by the warm bath: and I am informed by a physician of credit, that, in a case, in which the frequent use of the warm bath had not

given the shortest interval of ease, he made trial of a cold bath with almost immediate success. This is mentioned here, only as a single fortunate experiment. But* Citois informs us that this was his constant practice, even in the midst of winter : and he calls all his fellow citizens to witness, that most of his patients, thus treated, had been restored to health.†

* F. Citesii opuscula medica, p. 215.

† The late professor Gaubius mentioned to an English physician a method of treating this colic, which he had found successful in himself, and several others. Three drachms of *oculi cancrorum*, and one drachm of powdered rhubarb, were divided into eight equal parts, one of which was

This colic is very apt to return ; but particularly after that the palsy has taken place, on occasion of the least error in diet. Even the smell of paint has been sufficient to excite a fit of it. It was an observation of Dr. Reynolds, when he attended St. Thomas's hospital,

given every third hour, together with a draught of an infusion of some emollient herbs. This medicine, together with a clyster, administered occasionally, and a blister to the *abdomen*, is said to have completed the cure.

In Derbyshire the popular medicine is *cremor tartari*. One drachm of this is taken every hour, or every two hours, until a stool be procured. Afterwards the same dose of it is given once in four hours, until the disease be subdued.

that the colic, of all the workers in lead, frequently returned under any management whatever, whilst the poor people were allowed to wear the clothes in which they had been used to labour. And on this account, such clothes were never suffered to lie on the patient's bed.

In the palsy, consequential to this colic, beneficial effects have, in vain, been expected, as well from the external application of stimulants to the parts affected, as from the electric influence, howsoever modified, or directed.

Van Swieten affirms, that he sometimes cured it by the means of friction, and aromatic plasters, applied to the *abdomen* only, on this principle, that the disease, having originated in the abdominal nerves, ought to be attacked at its source. But this practice does not appear to have been established by the experience of others.

In this paralytic state, the French physicians first purge ; then give a sudorific decoction of the woods ; and afterwards send the patient to their sulphureous mineral waters. M. de Senac trusted principally to the warm bath. Whatever

tends to recover the stomach and intestines from the ill effects of the colic, and to prevent the return of it, is here pointed out. Under a course, therefore, of aromatic and bitter infusions (a due regard being at the same time had to the state of the bowels) some have been restored to their muscular power. Our Bath-waters, from their friendly effects on debilitated stomachs, have frequently been beneficial in this case : and it is observable, that there is this singular advantage in the use of these waters, that when other means of removing costiveness have failed, they have produced the effect so pe-

culiarly necessary to the patient. In cases where the organic fabric of the muscles seems to be destroyed, a speedy restoration of it is not to be expected; yet I have known more than a single instance where the Bath-waters, used several years successively, have reanimated the palsied parts, and restored them to their natural habit. Great benefit, in this case, has been derived from a course of warm-bathing, even in London.

When I was formerly treating this subject, I mentioned several means, by which the saturnine poison may find ad-

mission into the human stomach, unobserved and unsuspected. Farther enquiry has now enabled me to take notice of more instances of the same kind.

The sore nipples of women's breasts, washed with *extractum saturni*, have, in many instances, occasioned convulsions in children. Twelve infants died at Dartmouth, in convulsions, occasioned by an ointment, which had litharge in its composition, applied to the nipples of their nurses. This ointment was sold by a woman, famous for her skill in treating this complaint. More children

would probably have shared the same fate, had not the cause been accidentally discovered. A person, employed in *drawing the breast* of a woman, the nipple of which had been thus anointed, was affected with great sickness and pain in the stomach ; on which occasion the composition of the ointment was examined, and ascertained.

It was formerly observed, that the colic of Poitou appears to be a more frequent disease in France, than in this country. One cause, why it is so frequent in France, is that the French laws, though they are said to be severe on this sub-

ject, have not suppressed the adulteration of wine by means of litharge. In the year 1769, Sir John Pringle was informed by M. de Senac, that, since he had been employed at court, a wine-merchant, at Versailles, had been the occasion of the death of eighty or ninety persons, by selling litharged wine. The merchant confessed, that he had dressed his wine with litharge ; but declared his ignorance of its pernicious effects. M. de Senac added, that he had at that time, near one hundred patients, ill of this disease, in the hospital of Versailles, a large proportion of whom were servants to the king.

In the second volume of a French book, intituled *la Maison rustique*, there is a particular direction, that, in order to prevent the wines of Burgundy from turning sour, a ball of lead be suspended in each cask.* And what other reason can be suspected, why the Europeans in Surinam, and not the natives, are subject to this species of colic, than because the French wines, used by the former, contain a saturnine solution ?

* Il faut mettre dans chaque tonneau une bille de plomb pesant trois ou quatre livres, qui puisse passer par le bondon, et la suspendre au milieu du tonneau avec une ficelle. It is hoped, that a similar method of treating cyder does no longer prevail in the county of Devon.

There can be very little reason to doubt, but that physicians themselves have frequently laid the foundation of this disease. Sugar of lead was Paracelsus's specific in a *mania*. Sir Theodore de Mayerne entertained a great partiality in its favour, and reckoned it among the sweeteners and correctors of the blood. Accordingly, he prescribed large doses of it for various purposes. Particularly, he affirms, that he could cure a *gonorrhœa* in three days, by the repeated use of a bolus, containing one scruple of sugar of lead. The very powerful effects of this salt were remarkably exhibited in a case,

which I shall relate, on the authority of Mr. Knight, surgeon to the Coldstream regiment of foot-guards. A soldier, having contracted a *gonorrhœa virulenta*, took a drachm of sugar of lead in milk. In about five hours after that he had taken it, he was seized with great pain in his bowels and back, and with a violent and excruciating distention above and below the navel. Not suspecting what was the true cause of his present sufferings, he repeated the same dose. Within an hour afterwards his complaints increased ; he became delirious ; lost his power of speech ; sweated profusely ; and dis-

charged by vomiting much green bilious fluid. In the mean time, his pulse was remarkably soft and slow, not exceeding forty strokes in a minute. His stomach having been well drenched with warm water and oil ; and his bowels having been at length cleared by a frequent repetition of clysters, and purgatives taken by the mouth, his colic ceased, and his senses, and power of speech returned. The *gonorrhœa*, which had been very severe, was entirely cured in two days: and, what is still more extraordinary, some old venereal ulcers, which had withstood a long course of mercury, appear-

ed as suddenly to have put on an appearance of healing.

The preparation of the *oxymelita*, according to the *pharmacopœia* of London, *in vase fictili vitreato*, lies open to criticism. Indeed it has already been observed, with respect to these medicines by Lewis,*
 “that vinegar, by a boiling heat, may corrode so much of the vitrified lead, as to receive from it noxious qualities.” And it is well known, that vinegar, boiled for some time, in glazed earthen vessels, will yield, on

* New Dispensatory, p. 352.

being inspissated, a true sugar of lead.

Our College has ordered the *tinctora rosarum* to be prepared *in vase vitreo, vel fictili vitreato*. But the College of Edinburgh, apprehensive that the vitriolic acid may be apt to corrode the glazing, has ordered the infusion to be made in a vessel of stone-ware. I mixed a scruple of the strong spirit of vitriol with two pints and half of boiling water in a common glazed earthen vessel. To a portion of this water, as soon as it was cold, I applied the common *liquor probatorius*; but there appeared no mark of a satur-

nine solution.* The vitriolic acid, indeed, readily unites with the *calces* of lead ; but that solution immediately is followed by a precipitation ; and the compound is indissoluble. Accordingly, I am informed, that both in Scotland, and at Birmingham, leaden, instead of glass vessels, are now used in the manufacture of oil of vitriol ; that, in the first use of them,

* To a saturated solution of sugar of lead, in distilled water, oil of vitriol was added, in small quantities, at a time, as long as it occasioned any precipitation. The precipitated powder being left to settle at the bottom, and the water being poured off clear, the test was added, but made no discovery of lead.

the acid dissolves a certain portion of the metal, leaving it on the surface of the vessel like a crust ; and that, after this, no more lead is dissolved.

I am informed by an apothecary of great experience, that he has frequently observed a considerable quantity of sugar of lead generated around the sides of the coarse glazed earthen vessels, used for the composition of *the lenitive electuary*. It is evident, that this must be the consequence, whenever the acid vegetable juices are suffered to stand for some time in such vessels. The stone-ware, the glazing of

which is a superficial vitrification of the clay itself, by means of the fumes of common salt, would more properly be used for this purpose, as being, if not quite proof against acids, incapable of communicating to them any thing noxious.

Wherever any of the vegetable acids are used in pharmacy, pewter-vessels ought to be carefully avoided by the apothecary ; for a solution of lead may thus be administered in a case where it is not intended. This caution will hold good particularly, when it is applied to the small pewter-funnels, which, as I am informed, are

generally made of pewter of an inferior quality. If a funnel, of this description, after that a vegetable acid has passed through it, be left to stand, without being cleaned, (which may happen) a crystallization of sugar of lead will be seen in the pipe ; and the next medicine, which has the fortune to be poured through it, whatever it be, will, probably, not be improved in virtue. In the course of the last winter, I saw a person who had the true colic of Poitou, which continued five days. On enquiry from whence this disease could owe its origin, I discovered, that the patient had long been in the

habit of drinking cyder, warmed in a pewter-pot. Being recovered, he determined to change his common drink ; and, in consequence, has had no return of the disease.

The College of Edinburgh has properly ordered, that the distillation of vinegar shall be performed in glass vessels ; and this rule ought to be universally followed. In one of my former papers I mentioned, that a saturnine taint is frequently found in distilled vinegar. Lewis* had probably made the same observation. Cer-

* New Dispensatory, p. 482.

tainly a mode, in which distilled vinegar may easily be impregnated with lead, had not escaped the notice of that ingenious chemist. “ The distilled
 “ spirit,” says he, “ must be
 “ rectified by a second distilla-
 “ tion, in a retort or a glass-
 “ alembic ; for though the
 “ head and receiver be of glass
 “ or stone-ware, the acid will
 “ contract a metallic taint from
 “ the pewter worm.”

Should it be made an objection to these remarks, that only a very small portion of lead can be admitted into the compositions, which have here been mentioned ; and that, therefore,

little danger can reasonably be apprehended from it ; the obvious reply would be, “ *abundans cautela non nocet.*” In all these instances, even the suspicion of danger ought to be avoided ; for here danger is not necessarily incurred. Secondly, it is not possible to ascertain the exact quantity of the poison, in question, which shall be, universally, either innocent, or hurtful ; since, like the other nervous poisons, it acts with peculiar severity on some habits, whilst others seem insensible of its power. It is affirmed by Zeller, in his *doctrina, signa, causæ, et noxia vini, lithargyrio mangonisati, variis ex-*

perimentis illustrata, that, whilst some were suffering the most grievous torments, occasioned by the litharged wine of Wirtenberg, many others were not hurt by the same wine, though they had drunk it even to intoxication. And Ilsemann, in his treatise *de colicâ saturninâ*, testifies, that among the workmen, constantly employed in the separating furnace, there were many who never had the least symptom of the colic, and some who were very slightly affected by it, though all were equally exposed to the same *effluvia*.*

* Both the treatises, here referred to

It is universally agreed on, that lead is an efficacious instrument in surgery. But that, externally applied, it is, in some constitutions, and under certain circumstances, capable of exciting its pernicious effects, is an opinion which has not much prevailed. It is experience only, which can confirm this opinion, or refute it. With a view to refer the matter to that test, I have subjoined the two following well authenticated histories.

have great merit. They are preserved by Haller in his third volume of *disputationes ad morborum historiam et curationem pertinentes*.

CASE I.

A young man had an eruption of small pustules on his arms, which after two or three weeks, appeared also upon his trunk, and extended down his thighs. On some parts of the right thigh the pustules were confluent, and raised the cuticle entirely, leaving the part, as if it had been scalded ; from which there was a considerable discharge of thin matter. The diseased parts itched much, and suffered great pain. He was advised to take small doses of calomel, and to apply an ointment, composed of one part of

the *unguentum saturninum*, and three of hog's lard. By the use of this ointment, the pain and itching were greatly relieved ; and, the disease afterwards increasing, and spreading all over the trunk of the body, and the extremities, insomuch that there was a loss of the cuticle in every part, and even of a portion of the nails of the fingers and toes, the ointment was liberally applied to all the parts affected. When he had thus used the ointment ten days, he was seized with severe pain in his belly ; and his navel was drawn towards the spine. He had no stool from the time when the pain commenced, till a pur-

gative medicine had been given, which was more than 24 hours. The purgative used was *the bitter purging salt*, two drachms for a dose, which were repeated every hour, till they had operated. After the operation, the pain was much less violent; but as it was not entirely removed; and as there still remained a disposition to costiveness, small doses of rhubarb were ordered. The symptoms not yielding to the rhubarb, *the bitter purging salt* was repeated, which operated more powerfully than before, and removed all pain. It returned, however, for several days afterwards; but was always relieved

by an opening medicine. It should be remarked, that, after the attack of the colic, he used no more of the *unguentum saturninum*.

CASE II.

A gentleman, who had, in general, been healthy, though of a tender and irritable state of nerves, strained the *tendo Achillis* of the right leg ; and, for a considerable time, either applied Goulard's *vegeto-mineral water* to the part affected, or wore a compress of linen soaked in that liquor, and fastened by a bandage. Though the complaint was not removed by this

means, the patient, by degrees, paid less and less attention to it, and, at last, left off all applications to the part affected. Some months afterwards, he strained the same tendon more violently ; and, after a few days, by favouring the part injured, he suffered the same accident on the *tendo Achillis* of the left leg. In this situation, he had recourse, by advice, to a bath of the *vegeto-mineral water*, prepared of the usual strength, and kept in an earthen vessel, of sufficient capacity, to admit of his putting into it both his legs up to the calf. This bath he used, for five or six minutes each time, every morning and

evening, and sometimes also at noon, for about a week or ten days ; when he found himself obliged to desist, by what appeared to him to be a violent cold, attended by a stiff neck. The malady, however, increased rapidly. He had a continual and obstinate costiveness, attended with a seeming contraction of the belly, and at the same time with a painful tension at the *præcordia*. The stiffness of the neck increased. The spine, and all the muscles, in general, became weak. The head was drawn to the left shoulder ; and the arm, thigh, and leg, on that side, were

languid and inactive. Whilst he was without motion, he felt little or no pain or uneasiness ; but the least motion was painful, and particularly if at any time he stooped, coughed, sneezed, or even extended the chest by a full inspiration.

First, gentle aperient medicines, and, particularly, *oleum ricini*, were given ; then sudorifics ; and a suitable embrocation was applied to the parts, which were the principal seat of the disorder. By these means the symptoms gradually abated in three or four weeks ; but a lameness of the left hip

and thigh still remained, and always grew worse in cold weather.

He afterwards went to Bath, where the use of the waters entirely removed the internal disorder; diminished the lameness; and gradually restored the limbs which had been most affected.

For some time afterwards, he was very subject to a considerable degree of lameness in the left thigh and hip; and particularly on a change of weather from mild to cold.

The effects of the strain had

been removed by the bath of saturnine water.

With respect to the first of these cases, it seems reasonable to conclude, that the disease, described, was the genuine effect of the external saturnine application. The only conjecture, which could tend, in any degree, to invalidate this conclusion, is, that some part of the ointment might possibly have found its way into the patient's stomach. But, surely, there is more than an equal degree of probability in a supposition, that a man, so circumstanced, would not only not voluntarily convey to his mouth a com-

pound so nauseous, but would even guard himself against the accidental admission of it by every possible precaution.

Nor does it seem less evident that *the vegeto-mineral water* excited the various spasmodic and paralytic symptoms in the latter case ; since we have no experience which would justify an opinion, that cold water, alone, applied to the lower extremities, could be a cause adequate to such extraordinary effects.

Before that I take leave of this subject, let it be understood that it is far from my intention

to reprobate the external use of lead in all cases and constitutions. That would be an attempt to destroy one of the main pillars of surgery. All that I would insist on, is, that it ought not to be trusted to the hands of the unexperienced ; and that whenever it is to be applied to a large surface of the body, and continued for a considerable length of time, caution and circumspection are particularly necessary.

P. S. Since the conclusion of this paper, I have received what follows, in a letter from Dr. Douglas. It contains the genuine observations of a phy-

sician in his own case ; which, therefore, seem to claim a more than common attention.

“ Some years ago I received
“ an accidental blow a little
“ below the inner ancle ; and,
“ being then obliged to remain
“ in a wheel-carriage for many
“ hours, I found the part affected,
“ at the end of my journey,
“ stiff and uneasy, with some
“ swelling and inflammation.
“ Business prevented my attention
“ to it : and on the third
“ day, the redness extended as
“ high as the knee, accompanied
“ with great pain. A
“ poultice, made of crumb of
“ bread, and a diluted solution

“ of the extract of saturn, was
“ applied at bed-time. My
“ sleep was soon interrupted by
“ a most violent cramp in the
“ calf of my leg. I endeavour-
“ ed to remove the spasm, by
“ changing the position of the
“ limb, but without success ;
“ and the pain was at length so
“ excessive, that I could not
“ continue in bed. The poul-
“ tice being now taken off, and
“ my legs immersed in warm
“ water, the cramp ceased.
“ Being relieved from pain, I
“ renewed the poultice, and
“ returned to bed, where I had
“ scarcely reposed myself a
“ half an hour, when the cramp
“ again seized me with more

“ violence than before ; and
“ I again had recourse to
“ warm water, and with the
“ same good effect. Having
“ now some suspicion of the
“ lead, I did not repeat the
“ poultice ; and I passed the
“ remainder of the night free
“ from pain. My friends not
“ being convinced that my sus-
“ picion was just, I tried the
“ same application on the fol-
“ lowing night : and suffered
“ as before, until the poultice
“ was removed. Still farther
“ to satisfy myself and my
“ friends, I gave the lead ano-
“ ther trial ; and the result was
“ exactly the same.

“ I have no desire to tarnish
 “ the reputation of so celebra-
 “ ted a medicine as the extract
 “ of saturn : but, if it be capa-
 “ ble of producing such an ef-
 “ fect as I have here related, it
 “ should certainly be used with
 “ some caution and reserve.”

THE following remarkable
 instance of the power of an ex-
 ternal saturnine application, in
 producing muscular debility,
 had not been received, when
 the former part of this paper
 was read at the College.

Dr. Reynolds knew a gentle-
 man, who brought on a tempo-

rary palsy of the *sphincter ani*, and, in consequence, an inability to retain his excrement, by freely using a strong solution of Goulard's extract of saturn, with a view to cure the piles. These were external, and some of them had bled, the rest were tumid and painful. Linen pledgets, dipped in this solution (made stronger than the *vegeto-mineral water*) were applied five or six times a day for about a week ; at the expiration of which time, he found the effect above mentioned, without any previous colic. This being perceived, he discontinued the use of the solution ; and, in a few days reco-

vered the contractility of his *sphincter*. Three or four months afterwards, the piles being very troublesome, he had again recourse to a somewhat weaker solution of the extract of saturn ; which he had not used more than three days, when he perceived the same want of power in the *sphincter*, which he had before experienced ; and, though he immediately desisted from the use of the solution, yet that muscle did not recover its action so soon as it had done after the former experiment.

